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THE

MEDICAL AND SURGICAL HISTORY

OF THE

WAR OF THE REBELLION.

PART III.

VOLUME I.

MEDICAL HISTORY.

BEING THE

THIRD MEDICAL VOLUME.

Prepared under the direction of the SURGEON GENERAL, United States Army.

By CHARLES SMART, Major and Surgeon, United States Army.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1888.

WAR DEPARTMENT,
SURGEON GENERAL'S OFFICE,
WASHINGTON, D. C., *January* 17, 1888.

BRIGADIER GENERAL JOHN MOORE,
SURGEON GENERAL, U. S. ARMY.

GENERAL:

I have the honor herewith to submit the Third and concluding Part of the Medical History of the War of the Rebellion. The *First Part*, published in 1870, consisted of a consolidation by departments and regions of the monthly reports of sick and wounded of the various regimental organizations, with appended extracts from special reports of medical officers, giving a view from the medical standpoint, of the movements of our armies and the many deadly struggles that took place between the opposed forces. The *Second Part*, published in 1879, was devoted to a thorough discussion of the alvine fluxes based on the materials, documentary and anatomical, collected by our medical officers during the war. Surgeon J. J. WOODWARD, its distinguished author, brought to his task a comprehensive knowledge of those records of the past, which form the historical basis of the professional opinions of the present day, on the nature and causation of these important diseases. Moreover, his intimate familiarity with the materials which had accumulated in the Army Medical Museum, and the enthusiasm with which he prosecuted their study, peculiarly fitted him for the work of laying before the profession the results of that study. Unfortunately, failing health and ultimately death, prevented the further progress of the work by the mind and hand that had conducted it thus far with such consummate ability. In July, 1883, the late Surgeon General CRANE expressed to me his desire that I should undertake the *Third Part* of the work; and, in view of my reluctance to assume this heavy responsibility, he gave me to understand that his wish in this instance was intended to carry the weight of an order. No conditions were imposed as to the matter or manner of the volume to be written, save that the valuable plates which Dr. WOODWARD had prepared, illustrative of the pathological changes in the intestinal tunics, should be embodied in the work. Since that time I have given my best endeavor to the fulfilment of this duty; and in presenting the completed results of these years of labor, I beg that their shortcomings and errors may be attributed to lack of judgment rather than to a want of careful and earnest consideration.

I have the honor to be, General,

Very respectfully, your obedient servant,

CHARLES SMART,
Major and Surgeon, U. S. A.

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THE

MEDICAL AND SURGICAL HISTORY

OF THE

WAR OF THE REBELLION (1861-'65).

PART III, VOLUME I.

BEING THE THIRD MEDICAL VOLUME.

CHAPTER I.—ON THE MEDICAL STATISTICS OF THE WAR.

I.—SICKNESS AND MORTALITY AMONG THE U. S. FORCES.

The First Part of this Medical Volume of the History of the War is mainly composed of a series of Tables giving the figures reported by various commands as expressing the facts connected with the occurrence of sickness and deaths from certain specified diseases among the troops composing them. To derive any information from these Tables other than that borne upon their face, as for instance, to compare their items one with another, or with similar statistics from other sources, it is necessary to convert their figures into others expressive of their relation to some common standard. But before deducing ratios of sickness and mortality in designated diseases from the figures tabulated, it may be well to recall some points connected with them that definite ideas may be obtained of their probable value.

1st. As to mortality actual and reported.—On page xxxvii of the Introduction to the First Part, it is shown by a comparison of data drawn from various sources that the actual mortality of our armies from May, 1861, to June 30, 1866, may be assumed to be closely approximated by the following figures:

Mortality.	White.	Colored.	Total.
Killed in battle	42,724	1,514	44,238
Died of wounds, etc	47,914	1,817	49,731
Died of disease	157,004	29,212	186,216
Died, unknown causes	23,347	837	24,184
Total	270,989	33,380	304,369*

* According to Dr. Joseph Jones (see *Richmond and Louisville Med. Jour.*, Vol. IX, 1870, p. 259), the deaths in the Confederate armies during the war did not fall short of 200,000, three-fourths of which number were due to disease and one-fourth to the casualties of battle. The data from which these conclusions were derived are said to have been critically examined and considered correct by the former Adjutant General of the Confederate States, S. Cooper, of Alexandria, Virginia.

If the deaths from unknown causes in this statement be distributed among the three causes specified in the proportion which the figures of each bear to their total, the deaths from disease will be found to amount to 171,806 among the white troops, and to 29,963 among the colored troops, giving a total of 201,769 deaths from disease.

Looking now at Table C,* which gives a general summary of the sickness and mortality among the white troops during the war, it will be found that, excluding 37,237 deaths attributed to wounds, accidents and injuries, there were reported 128,937 deaths from diseases that are specified and 449 from diseases that are not specified, making a total of 129,386 deaths reported as from disease.

But since the total mortality from disease was 171,806, it is evident that 42,420 deaths, or 24.7 per cent. of the total, were not reported, and that 42,869 deaths, or 24.9 per cent. of the total, were not attributed to their special causes. Hence, if it be desired to obtain from the Tables in the First Part of this work an approximation to the absolute mortality from any specified disease, we may assume, in the absence of other and accurate data, a "*pro rata* distribution of the 42,869 deaths from unspecified diseases and multiply the number in the tables by 1.33, since the number of deaths tabulated and reported as due to specified causes, to wit, 128,937, is to the whole number of deaths attributed to disease, 171,806, as 1 : 1.33. Thus, taking acute and chronic diarrhœa and dysentery by way of illustration, it is found that the deaths reported as from these diseases numbered 37,794; but the actual mortality caused by them must have been considerably greater, to-wit, about 50,226.†

Again, looking at Table CXI,‡ which gives a general summary of the sickness and mortality of colored troops during the war, it will be found that in the strength represented, 27,499 deaths were reported from specified diseases. This number is less by 2,464 than the actual mortality, 29,963, in the strength present and absent. The tables, therefore, embrace 91.8 per cent. of the mortality statistics of the colored troops. If an approximation to the actual mortality be desired in the case of any given disease, it may be obtained from the figures in the statistical tables by the use of the factor 1.09. Thus, in the case of the alvine fluxes, the tables give a mortality of 6,764, but the actual mortality was probably about 7,373.‖

2d. As to mortality rates.—Although the figures given in the tables constitute but 75.3 and 91.8 per cent. of the total mortality among the white and colored troops respectively, it is to be remembered that the strength in which this tabulated mortality occurred was only a part of that which furnished the total. The tabulated deaths took place among the men in the field and garrisons, and among the floating population of the general hospitals in which the sick from the field and garrisons were treated, when, for military or medical reasons, it was deemed expedient to send them to a distance from their commands. The untabulated deaths of white and colored soldiers, 42,420 and 2,464, respectively, occurred firstly, in commands the reports of which were not received, or if received were not embodied in the tables on account of some defect which rendered them valueless for the computation of rates; secondly, among men separated from their commands by the fortune of war and held as prisoners by the enemy; and thirdly, among those not borne as present numerically in the strength of their commands on account of temporary absence on furlough or various special duties.

* Part First, p. 641.
† See Dr. Woodward's calculation, p. 3 of Part II, where the actual mortality in this instance is figured as 49,685.
‡ Part First, p. 712.
‖ Dr. Woodward's calculation puts the number at 7,380.

With regard to untabulated deaths due to unrendered or rejected reports, the assumption seems warranted that, had these reports been received in a condition to admit of their incorporation in the tables, it is not likely that the rates calculated from the latter would have been materially altered, since the numbers tabulated were in themselves so large, and constituted so large a percentage of the deaths that occurred in the field, garrisons, and general hospitals. Dr. WOODWARD estimated that, in a general way, the tables covered about nine-tenths of the class of facts which they were intended to embrace.

With respect to the deaths that occurred among prisoners of war, they are with propriety excluded from data forming the basis of an inquiry into the mortality rates affecting our armies in the field, since, as is well known, the circumstances surrounding these unfortunate men were such as predisposed to a higher rate of mortality. Had full returns of the deaths among them, with a knowledge of the numerical strength present in the prisons during the war, been preserved, they would have served as materials for an interesting study; but it would not have been advisable to consolidate them with the mortality statistics of men under wholly different conditions.

Similarly, it seems proper to exclude from consideration the deaths that occurred among the large number of men absent from their commands on furlough and by reason of other causes, as this class was for the time being removed from the influence of the causes and conditions which favored mortality among the men on active service. It is highly improbable that the deaths among them were relatively as numerous as among men on field duty. Although many men were furloughed because they were sick, and undoubtedly many deaths occurred among such cases, the majority of those thus furloughed were convalescents looking for improvement and return to health during their temporary sojourn at home. The number of these absent from their commands cannot be obtained; but had it been possible to have ascertained all the facts, their consolidation with the matter of the statistical tables of Part First would have introduced an element which would have required elimination before the rates affecting the troops on active service could have been deduced.

We may therefore accept the conclusion that death rates based on the tabulated figures, notwithstanding the incompleteness of the latter, will furnish a fair index to the mortality caused by the morbific influences to which the army was subjected during the years of the war.

3D. AS TO THE CASES OF SICKNESS, ABSOLUTE AND REPORTED.—The tabulated statistics show the occurrence among white troops of 5,417,360 cases in which the disease is specified and 7,187 cases of unspecified disease, making a total of 5,424,547 cases of disease, exclusive of 400,933 cases of wounds, accidents and injuries comprised in Class V of the official reports. This number of cases of disease is far from including the whole of those furnished by the army during the war. The tabulated mortality among the white troops has been shown to be deficient by 24.7 per cent. The deficiency in the tabulation of the cases is even greater, as it includes not only cases among prisoners of war and others absent from their commands as well as those in commands which failed to make the required reports, but also the many cases that occurred among the floating population of the general hospitals. The strength of these hospitals was reported regularly; but it was found impossible, as already explained,* to ascertain the number of cases of sickness that

* Introduction, Part First, p. XXIV.

originated in them or the number of cases that were received without having been previously reported on regimental returns.

The same remarks are applicable to the 605,017 cases of specified diseases which are reported in the tables as having occurred among the colored troops.

4TH. AS TO SICK RATES.—But although the statistical tables give only an unknown percentage of the sickness which affected our armies, their application to the calculation of correct rates is not impaired thereby. They give, we may assume, a fairly accurate representation of the attacks of sickness that occurred in those commands in "field and garrison" from which reports were received. The large number of men, a mean strength of 431,237 white and 61,132 colored troops, under observation, warrants the belief that the rates deduced from the reports would not be materially altered if to these reports had been added the mean strength and total cases of sickness of commands which failed to report, or sent in reports which were valueless in this connection by the omission of needful data. The remarks already made with regard to mortality rates among prisoners of war and others absent from their commands are equally applicable here. Supposing the necessary figures for calculating the ratio of cases to strength among them to be available, the propriety of consolidating these rates with those from troops in active service would be subject to question, as tending to complicate the point at issue by the introduction of results due to other conditions. For similar reasons it would have been proper to have excluded from the tabulated reports the cases originating in the general hospitals, as the conditions affecting the inmates of these hospitals were certainly very different from those which determined attacks of sickness in the field. As it is, those cases were not reported. A complete medical history of any war necessarily involves the separate presentation of the facts reported from the various classes of men and their comparison with those gathered from the men present for duty with the flag; but the difficulties in the way of obtaining the necessary data are so great that it is doubtful if such a history will ever be written. While regretting the want of records covering the attacks of sickness in the whole number of men who were enrolled for service, it suffices at present to point out that this want does not affect the value of the sick rates deduced from the reports which form the main part of the First Part of this work.

5TH. THE RATES OF FATALITY IN SPECIFIED DISEASES.—In comparing the number of deaths from a given disease with the number of cases of the same disease to ascertain the percentage of fatal cases caused by it, a point of importance comes up for appreciation. It has been shown that neither the deaths nor the attacks tabulated form the respective totals of these occurrences, but only an uncertain though comparatively large portion of them; and it has been argued that this want of absolute figures does not detract from the value of the death rates and sick rates as deduced respectively from the strength given in connection with the figures of each, to wit: the strength present in the field and garrison in connection with the cases, and the strength present in the field, garrisons, and general hospitals in connection with the deaths. But in considering the ratio of deaths to cases their abnormal relationship, consequent on their derivation from different numbers of men, must not be forgotten. The cases occurred in the strength present in the field and garrisons; the deaths in the strength present in the field, garrisons, and general hospitals. The strength which furnished the cases, 431,237, in the instance of the white troops, was smaller than the strength, 468,275, which furnished the deaths. If the cases which

originated in the hospitals were known, their addition to the others would establish a normal ratio between the cases and deaths. Or, if the deaths which occurred among such cases were known, a similar result would be obtainable by deducting them from the tabulated deaths. But, as it was found impossible to rectify this matter by either of these methods, there exists this want of relationship between the deaths and cases.

In calculating from the tabulated figures the rate of fatality of a given disease, a figure of unknown and probably different value for each disease, caused by the unrecorded cases among the hospital population, tends to increase the percentage of fatal cases.

The fatality of cases originating in the general hospitals was probably greater than that of those occurring among men in active service, for although the latter had a greater exposure to many of the causes of disease, they had at the same time a greater power of resistance against these morbific influences. The exposures of the field may be regarded also as having tended to multiply cases and to correspondingly lessen the fatality of disease among the troops as compared with the rates affecting a hospital population. If, therefore, we assume that the same rates prevailed among the floating population of the hospitals as in the commands from which their population was derived, we shall ascertain a portion of the error which is involved in a calculation of rates from the deaths and cases in the tables already published.

On this assumption the deaths attributable to diseases originating in the hospitals and those attributable to diseases originating in the field and garrisons would be respectively proportional to the number of men present in each; and the factor .921, obtained by dividing the strength present in the field and garrison by the total strength in the field, garrison and general hospitals, when applied to the rates of fatality calculated from the cases and deaths recorded in the First Part of this work, would reduce these rates by the elimination of the deaths assumed to have taken place among cases that originated in the hospitals. In this way a part of the error is indicated, the true rate of fatality being lower even than this corrected rate. Thus, in the case of typhoid fever among the white troops,* where 75,368 cases in the field and garrison are associated with 27,056 deaths in the field, garrison, and general hospitals a mortality of 35.9 per cent. is obtained; but this, for the reason given, is certainly higher than the true rate of fatality. Multiplied by the factor .921 the percentage becomes reduced to 33.0, and this probably expresses the very highest figure at which we may put the mortality from typhoid fever as deduced from the tabulated statistics. When we come to consider the continued fevers it will be found that this corrected percentage is open to question; but the present object is merely an illustration of an inaccuracy which affects the rates of fatality when deduced from the published figures.†

The factor .921, based on the mean strength for the whole period of the war, has necessarily a general character. The error which it is intended to define varied month by month and year by year in the same command, and differed in different commands during the same periods in proportion to the number of men constituting the hospital population. In the following pages the rates of fatality will be calculated from the figures as reported in the First Part of this work. Those who desire greater precision in individual cases

* Page [illegible] First Part.

† [illegible], in an article on the *Treatment of Typhoid Fever*, in the Philadelphia Medical News, March 29, 1884, tabulates the typhoid cases [illegible] in the First Part of this work and calculates the fatality among white troops at 37.9 per cent. of the cases, without observing that the cases and deaths did not occur among the same number of men.

may make use of the average factor above stated, or calculate the factor specially applicable to the case in point in accordance with the statement given of the principle involved.

General and annual rates of sickness and mortality.—The number of cases of disease reported among the white troops during the period, May 1, 1861, to June 30, 1866, was 5,424.547, and the number among the colored troops during the three years ending with the latter date was 605,017, making a total of 6,029,564 reported cases of disease.

During the same period the deaths reported as from disease numbered 129,386 among the white and 27,499 among the colored troops, making a total of 156,885; but, as has been already explained, if it be desired to obtain numbers which will express the absolute mortality from disease in our armies, the factor 1.33 must be used in the case of the white, and 1.09 in the case of the colored troops, to provide for the addition of 42,420 deaths among the former and 2,464 deaths among the latter, as the proportion of deaths from unknown causes which may with propriety be ascribed to disease. There were, therefore, during the war and the year that followed it 171,806 deaths among the white and 29,963 deaths among the colored troops, making a total in the United States Armies of 201,769 deaths which were attributed to disease.

The cases and deaths available for the calculation of rates of sickness and mortality are equivalent to 12,579 cases and 276 deaths in every 1,000 of the white troops during the five and one-sixth years covered by the reports, and 9,897 cases and 430 deaths in every 1,000 of the colored troops during the three years similarly covered. Disease among the latter is thus seen to have been not only of more frequent occurrence but considerably more fatal than among the former. This may be better seen by presenting the statistics of the colored troops on a basis of five and one-sixth years of service, when the numbers are found to be 17,044 cases and 740.6 deaths, equivalent to 135.5 cases and 268.4 deaths respectively for every 100 cases and every 100 deaths among the white troops. The greater liability of the colored troops to disease and death is also clearly shown by the presentation of the statistics in the form of annual rates. The average annual numbers among white soldiers per 1,000 of mean strength were 2,435 cases and 53.4 deaths; in the colored command the corresponding numbers were 3,299 and 143.4.

Table I.

Showing the Annual Movement of Sickness and Death among the White and the Colored Troops, expressed in ratios per 1,000 of mean strength.

	For the year ending June 30th—												Average annual rate per 1,000.	
	1861.		1862.		1863.		1864.		1865.		1866.			
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
White Troops	3,822	10.8	2,983	49.	2,696	63.	2,210	48.	2,273	56.	2,362	42.	2,435	53.4
Colored Troops	.....	.....	.....	.....	.....	.....	4,092	211.	3,205	140.	2,797	94.	3,299	143.4

It may be inquired how these figures compare with the records of other armies. To institute a satisfactory comparison between the sickness and mortality of armies of different nationalities is difficult, especially in dealing with the records of war service. Besides differences in nomenclature and in methods of reporting, which interfere with just com-

parisons in time of peace, the war records are usually more or less indefinite in certain items of information, as of strength present, needful to the calculation of comparative rates.

There is, however, little to be gained by comparing the statistics of one campaign with those of others conducted under wholly different conditions. Each may be advantageously studied for the special lessons inculcated, but unless similar general conditions coincided with particular conditions which were not similar, there is no profit in the comparison. The medical histories of the French and English armies before Sevastopol present many fruitful comparisons, but it is of little moment to place the 94.9 deaths* per 1,000 of strength which occurred from disease in the English ranks in January, 1855, by the side of our average annual rate of 53.4, or to note that during that one month diseases of the stomach and bowels, chiefly diarrhœa and dysentery, caused among the British troops as many deaths, 62.7 per 1,000 strength,† as were occasioned by all diseases in our armies during 1862–3, the year of their highest mortality, 63 per 1,000. For similar reasons it is needless to enter into detailed comparisons between the rates above mentioned and the 14.30‡ deaths per 1,000 of strength, equalling an annual rate of 24.51, which occurred from disease during the seven months of war, August, 1870, to February, 1871, inclusive, in the Prussian army.

The standard of comparison for each army should be its own average sick and death rates derived from the records of a series of years during which it was exposed to no specially unfavorable conditions, or, preferably, the best annual record furnished by its history, as all deviations from that record indicate, when their causes are investigated, not only how they may be avoided in the future, but how the standard itself may be improved.

The difference between such a standard and the disastrous experience of the English during the first half of the Crimean war was a measure of the virulence of the unusual morbific agencies to which their army was exposed.

* *Medical and Surgical History of the British Army which served in Turkey and the Crimea during the War against Russia in the years* 1854–6. Official publication, London, 1858, Vol. II, p. 44.

† *Op. cit.*, last note. Table B.

‡ Calculated from the figures given by Dr. ENGEL in the *Zeitschrift des Kön Preussischen Statistischen Bureaus Jahrgang* 12, Berlin, 1872, p. 250. The mortality from disease in the German army during the war of 1870–71 was as follows:

MORTALITY.	NUMBER.	RATES PER 1,000 MEAN STRENGTH.
Deaths from acute internal diseases:		
Dysentery	1,971	2.31
Typhus	6,935	8.14
Gastric Fever	158	0.18
Small-pox	249	0.29
Inflammation of the air-passages and lungs	491	0.57
Other diseases	515	0.61
Deaths from chronic internal diseases:		
Consumption	521	0.61
Other internal diseases (chronic)	246	0.29
Sudden death (from disease)	93	0.10
Cases in which the disease was not given	553	0.64
Cases in which the cause of death was not given	415	0.56
TOTAL	[illegible]	[illegible]

The strength (850,650) from which these rates were calculated was obtained from Dr. ENGEL'S statement of the total number of deaths from disease and injury (40,743) and of the rate (47.90) per thousand of mean strength to which this total corresponded.

The difference between the ordinary death rate from disease in the German army, 5.64 in 1868 and 4.76 in 1869,* and the war rate of 1870, already instanced, shows the operation of insanitary causes which might be specified with more or less accuracy by detailed comparisons. The German record during this war is noteworthy as having presented a death rate from disease considerably smaller than that resulting from the casualties of battle. The total death rate, 47.90 per thousand strength, in the seven months of active operations consisted of 33.60 from violence and 14.30 from disease, the latter being equal to an annual rate of 24.51 per thousand. But when this record is compared with its proper standard, the mortality of the German army in time of peace, it will be observed that a very notable increase took place in the deaths from disease on account of the exposures incident to the seven months of war. The death rate, in fact, became quadrupled.

When our own war statistics, as given above in annual rates per 1,000 of strength, are compared with similar figures derived from reports covering eighteen years of the history of the army,† it will be found that the morbific influences to which our troops were subjected were such as to increase the annual death rate from disease by 34.50 per 1,000 of mean strength. The peace rate, 18.98 per 1,000, became nearly tripled by the war influences. Our war rate does not appear great when viewed in relation to the mortality rates of previous years and to the English and German figures instanced as expressing the mortality

* These rates were obtained from the *Sanitäts Bericht ü. d. Preuss. Armee*, 1868–69, pp. 40, 142–145, 203, and 298–301. The mean strength during 1868 was 250,376 and the mortality from disease 1,413; the strength during 1869 was 248,246 and the mortality 1,183.

† The records of the Surgeon General's Office show that, excluding deaths from wounds, accidents and injuries, and also those from Asiatic cholera and yellow fever, the annual mortality rate of the United States army during eighteen years of peace which preceded the outbreak of the civil war averaged 18.98 per 1,000 of strength, the extremes being 8.4 in 1845 and 39.6 in 1849. The deaths in excess of the minimum were due for the most part to diarrhœa and dysentery, continued and remittent fevers. The following table has been compiled to show the death rates from disease that prevailed in the army before the war. The years 1847–48 are not included, as the troops were then on active service in Mexico.

Year.	Strength.	Deaths from—			Death Rate from—	
		All Diseases.	Cholera.	Yellow Fever.	All Diseases.	Exclusive of that from Cholera and Yellow Fever.
1840	10,116	241	.....	10	23.8	22.8
1841	9,748	367	.....	6	37.6	37.0
1842	10,000	291	.....	28	29.1	26.3
1843	9,863	156	.....	12	16.2	14.6
1844	8,570	95	.....	11	11.1	9.8
1845	8,500	72	.....	.....	8.4	8.4
1846	9,083	175	.....	.....	19.3	19.3
1849	9,148	721	307	52	78.8	39.6
1850	8,570	268	60	3	29.9	23.3
1851	9,242	280	91	.....	30.3	20.5
1852	9,200	208	26	.....	22.6	19.8
1853	9,994	266	94	4	26.6	16.8
1854	8,625	229	18	83	27.7	15.2
1855	9,367	305	104	20	32.6	19.3
1856	10,444	351	78	2	29.7	29.5
1857	13,494	167	.....	14	13.1	12.0
1858	14,540	202	6	.....	13.9	13.5
1859	15,510	249	.....	72	15.5	10.8
Average	10,817	252	.....	.....	24.32	18.98

The figures of this table may be compared with those for the years 1866–83, given in note upon page , as well as with those in Table I of the text.

induced by war conditions. It is the mortality rate of our army in the years of peace preceding the war that compares unfavorably with the analogous German rate, and gives the high rate of death from disease when that consequent on the aggregation of our troops in large masses and the exposures incident to field service are superadded. Our army was scattered at posts in all parts of the country which afterwards became the theatre of war, and was exposed to the same miasmatic agencies which subsequently attracted more notice on account of the large number of men constituting the commands. The peace rate of 18.98 shows the insanitary conditions to which our troops were subjected during those eighteen years. The increase to 53.48 during the war is the measure of the mortality directly referable to its morbific influences.

But when, instead of the average of many years, the best annual record furnished by the history of our army is accepted as a standard, the influence of the war in giving potency to the causes of disease becomes very manifest. The rates 8.4 in 1845, 9.8 in 1844, and 10.8 in 1859 are much below the average of the eighteen years. Favorable conditions conduced to this relatively light mortality. But these favorable conditions were, as will be shown directly, in great part susceptible of attainment in other years.* The average of these rates, 9.33, may therefore be accepted as indicating the unavoidable mortality from disease in a body of men constituted and circumstanced as was our army before the war; and the large increase of 44.15 deaths per 1,000 of strength annually is necessarily referred for causation to the war influences.

The war rates assume a larger relative magnitude when the rates which have prevailed among our troops since the war is made the basis of comparison.* The average annual

* The following table exhibits the mortality rates, exclusive of those from wounds, accidents and injuries and also those from Asiatic Cholera and Yellow Fever in the army since the war, and may be compared with that given in the note to page 8, *supra*.

TABLE *showing the Annual Death Rates among the White Troops of the United States Army since the close of the War of the Rebellion.*

Year.	Mean Strength.	Deaths from—			Death Rate from—	
		All Diseases.	Cholera.	Yellow Fever.	All Diseases.	Exclusive of that from Cholera and Yellow Fever.
1866-7	40,183	1,529	747	7	38.05	19.29
1867-8	45,022	1,188	139	427	26.39	13.82
1868-9	37,197	376	2	1	10.11	10.03
1869-70	28,660	249	.....	19	8.69	8.03
1870-1	[illegible]	[illegible]	.....	[illegible]	[illegible]	[illegible]
1871-2	24,116	263	.....	20	10.91	10.08
1872-3	24,897	247	2	.....	9.92	9.84
1873-4	25,786	218	6	16	8.45	7.69
1874-5	21,939	158	.....	2	7.20	7.11
1875-6	21,718	169	.....	30	7.78	6.40
1876-7	23,383	179	.....	2	7.66	7.57
1877-8	20,813	122	.....	.....	5.86	5.86
1878-9	[illegible]	[illegible]	.....	[illegible]	7.3[illegible]	[illegible]
1879-80	22,086	126	.....	.....	5.70	5.70
1880-1	21,174	131	.....	2	6.19	6.09
1881-2	[illegible]	[illegible]	.....	.....	[illegible]	[illegible]
1882-3	[illegible]	[illegible]	.....	[illegible]	[illegible]	[illegible]
Annual average	[illegible]	[illegible]	[illegible]	34.4	12.80	9.51

mortality from disease for the seventeen years, 1866–7—1882–3, was but 9.51 per 1,000, although the country occupied by the troops and the unavoidable causes of disease to which they were exposed were the same as in the years preceding the war. This rate, taken as a standard, refers the large annual mortality of 43.9 directly to the exposures incident to the war. But if the average rate of the ten years, 1873–4—1882–3, be made the basis of comparison, the war influences become correspondingly magnified. This rate, 6.74, is but slightly in excess of the minimum, 5.70, in 1879–80. The causation of this great diminution in the death rate of our soldiers of late years is readily appreciated. After the war the regular troops were distributed mainly over the undeveloped West to hold the Indians in check and promote the settlement of the country. The old posts which had been occupied before the war were in ruins, and the new conditions developed by the advance of civilization westward required the establishment of garrisons in positions which had formerly been unoccupied. Military policy rather than hygienic considerations usually dictated the selection of the site, and in many instances the stations were established in unhealthy river bottoms for the sake of being near to a water supply. The quarters built by the troops were of the most primitive character, the materials at command being only such as the country afforded. Practically, our soldiers during the years 1867 and 1868 were in the field, and hence the high death rate. But in the years that followed, posts which experience had shown to be unhealthy were abandoned, and money was appropriated for the construction of barracks at such stations as appeared likely to require permanent occupation. The conditions became gradually changed from those attending a state of war or active field service to those of garrison duty in time of peace, although occasional campaigns against hostile Indians kept the mortality rate higher than a purely peace rate should be. The average rate of the past ten years testifies to the efforts of the Medical Department on behalf of the soldier, and the earnest and intelligent co-operative action of military commanders.

The popular idea that our armies suffered severely from disease during the campaigns of the civil war is thus well sustained by the statistics, in view of the fact that no notable epidemic of imported pestilence, as of typhus, cholera, or yellow fever, contributed to their mortality. Had our camps been unhappily visited by these scourges, our annual mortality of 53 per 1,000 of strength would have appeared light in comparison with the terrible record which would have formed the text of a medical history of the period.

SICKNESS AND MORTALITY AS CAUSED BY VARIOUS DISEASES AND CLASSES OF DISEASE.—It has been already stated that among the white troops the cases of disease reported during the five and one-sixth years embraced in the statistical records numbered 12,579 and the deaths 276 in every 1,000 men of mean strength, these figures being equivalent to the annual rates of 24.34 and 53.48 respectively. It has also been stated that among the colored troops during three years of service there were recorded 9,897 cases of sickness and 430 deaths from disease in every 1,000 men of mean strength, figures equal to the annual rates of 3,299 and 143.4 respectively. The following table is designed to give a general view of the distribution of these cases and deaths under specific and generic headings. The first two columns of each division of the table represent the sickness and deaths that occurred during the whole period, the figures being ratios per 1,000 men of mean strength; the last two columns show to what extent the specified diseases contributed to the totals of the cases and deaths that were reported as from disease.

TABLE II.

Showing the Comparative Frequency of, and Mortality from, the Diseases that prevailed among the White Troops of the U. S. Army during the period from May 1, 1861, to June 30, 1866, and among the Colored Troops during the period from July 1, 1863, to June 30, 1866.

DISEASES.	WHITE TROOPS.				COLORED TROOPS.			
	Cases per 1,000 of mean strength.	Deaths per 1,000 of mean strength.	Cases per 1,000 of total cases of disease.	Deaths per 1,000 of total deaths from disease.	Cases per 1,000 of mean strength.	Deaths per 1,000 of mean strength.	Cases per 1,000 of total cases of disease.	Deaths per 1,000 of total deaths from disease.
Continued Fevers	208.16	59.91	16.55	216.89	68.98	37.36	6.97	86.24
Typho-malarial Fevers (*a*)	115.65	8.67	9.19	31.37	123.16	20.35	12.44	47.31
Malarial Fevers	2,698.78	17.38	214.55	62.91	2,488.73	30.08	251.47	69.93
Diarrhœa and Dysentery	3,675.93	80.71	292.23	292.10	2,518.14	105.81	254.40	245.97
Diphtheria (*a*)	16.87	1.53	1.34	5.53	12.69	.95	1.28	2.22
Eruptive Fevers	240.82	23.26	14.85	84.19	276.86	55.08	27.97	128.04
Other Miasmatic diseases (*b*)	404.60	5.33	32.16	19.23	396.90	8.98	40.13	20.88
Total Miasmatic diseases	7,306.84	196.79	580.67	712.21	5,885.46	258.62	594.68	601.19
Syphilis, Gonorrhœa and Orchitis	423.85	.29	33.69	1.05	233.22	.50	23.56	1.16
Scurvy	71.22	.82	5.66	2.96	265.28	6.07	26.80	14.11
Rheumatism, acute and chronic	590.71	1.01	46.96	3.67	525.50	3.67	53.10	8.55
Consumption	31.30	11.29	2.49	40.85	21.77	18.94	2.20	44.04
Itch	74.39	.....	5.91	.....	51.63	.....	5.22	.....
Diseases of Nervous System	394.29	9.49	31.34	34.33	391.53	12.75	39.56	29.64
Diseases of Eye and Ear	272.75	.02	21.68	.06	158.33	.03	16.00	.07
Diseases of Circulatory Organs	58.22	3.54	4.63	12.81	25.50	7.31	2.58	16.98
Acute Bronchitis and Catarrh (*b*)	901.57	2.53	71.67	9.16	531.91	4.07	53.73	9.46
Inflammation of Lungs and Pleura	215.78	32.73	17.15	118.47	381.27	86.62	38.52	201.35
Other diseases of Respiratory Organs	235.32	2.97	18.71	10.74	151.03	6.35	15.26	14.76
Total Respiratory Organs	1,352.67	38.23	107.53	138.36	1,064.22	97.04	107.53	225.57
Diseases of the Digestive Organs	1,306.10	8.85	103.83	32.04	887.77	15.19	89.70	35.31
Urino genital disease	69.28	.92	5.51	3.32	40.34	2.05	4.08	4.76
Diseases of Bones and Joints	18.73	.10	1.49	.36	13.54	.23	1.37	.53
Boils, Abscesses and other Integumentary diseases	440.17	.46	34.99	1.67	192.37	.42	19.44	.98
GRAND TOTAL	12,579.04	276.30	1,000.00	1,000.00	9,896.89	430.2	1,000.00	1,000.00

(*a*) Cases were reported under this heading only during the period from June 30, 1862.

(*b*) In the composition of this table the figures reported under the heading Epidemic Catarrh have been dropped from the class of miasmatic diseases and consolidated with the diseases of the respiratory organs, as there seems good reason for believing that influenza was at no time prevalent among the troops. See *infra*, page 725.

Among the white troops diarrhœa and dysentery occurred with great frequency and occasioned a large mortality. These intestinal affections were the cause of more than one-fourth of all the entries upon the sick reports; and it is a singular coincidence that their reported cases bear to the reported cases of all diseases the same ratio, 292 per thousand, that the deaths occasioned by them bear to the total deaths from disease. Malarial fevers followed in order of frequency, having constituted, if typho-malarial cases are included, about one fourth of the whole number of cases of disease. These caused nearly one-tenth of the total deaths, a mortality almost reached by the eruptive fevers, which, however, occasioned only 14.8 of every thousand of the cases. But in order of gravity the continued fevers, consisting mainly of typhoid cases, took the second place, having caused 216 deaths in every thousand from disease, although contributing only 16.5 cases to every thousand

cases of all diseases. To the miasmatic diseases as a class were attributed considerably more than one-half, 581 cases per thousand of all diseases, of the entries on sick reports, and nearly three-fourths of the mortality, 712 deaths in every thousand. The only other classes of disease which furnished high rates of prevalence, diseases of the digestive and of the respiratory organs, agreed closely in their number of cases, 103.8 of the former and 107.5 of the latter, contributed to every thousand of all diseases; but the deaths caused by the diseases of the respiratory organs assumed a higher proportion, 138.4 per thousand, on account of the gravity of the pneumonic cases. Scurvy as an individualized disease caused less than 6 in every thousand of the cases and less than 3 in every thousand of the deaths.

The second part of the table presents the parallel facts deduced from the medical statistics of the colored troops. Among the colored, as among the white troops, diarrhœa and dysentery occurred with great frequency and fatality. The ratio of cases of these intestinal affections to the total number of cases of disease was 254.4, and of deaths caused by them to the deaths caused by all diseases, 245.97 in every thousand of each respectively. Malarial fevers constituted one-fourth of the whole number of cases of disease, and caused, if typho-malarial fevers are included, somewhat more than one-tenth of the deaths. But inflammation of the lungs occupied the second place in the order of gravity, the deaths from this cause having formed 201.3 of every thousand from all diseases. The eruptive fevers occasioned 128 of every thousand deaths. The continued fevers did not occupy so prominent a place in the medical records of the colored troops as in those of the white regiments; the cases formed only 6.97 of every thousand cases of all diseases, and the deaths 86.84 of every thousand deaths from disease, as compared with 16.55 and 216.82, the corresponding numbers from the records of the white troops. Miasmatic diseases as a class caused 594.68 of every thousand cases and 601.19 of every thousand deaths. Scurvy attained a decided prominence among the colored troops as compared with its prevalence among the whites. It was nearly as frequent as the eruptive fevers, 26.80 cases having been recorded in every thousand cases of disease; and a comparatively large number of deaths were attributed to it, 14.11 of every thousand from all cases, as against 2.96 among the white troops.

Incidentally a comparison may be instituted between the sickness and mortality of the white and the colored troops by noting the figures in the third and fourth columns of Table II, in connection with the corresponding figures in its seventh and eighth columns. The first two columns of each division of this table are insusceptible of comparison, as they do not refer to equal periods of time, but in the following table the average annual rates of sickness and death in the white and the colored commands are strictly comparable.

From this table the greater sickness and the very much larger death rate among the colored troops may be appreciated and referred to the disease or classes of disease that occasioned them. There occurred on the average annually in every thousand of the colored men 143.4 deaths from disease as compared with 53.48 among the white troops; and as the sickness of the former, although large, was not proportionally increased, the greater fatality of disease among them is manifested.

Malarial diseases caused 829.58 cases as against 522.34 among the white troops, and 10.03 deaths as against 3.36, whilst at the same time cases reported as typho-malarial were more numerous and very much more fatal among the colored commands. Evidently, from these figures, the latter did not possess that insusceptibility to the malarial influence that

has been sometimes claimed for them.* Indeed, an insusceptibility to the typhoid poison rather than to the malarial influence appears suggested, for the average annual number of

TABLE III.

Showing by Average Annual Rates per 1,000 of mean strength the Comparative Frequency of, and Mortality from, the Diseases that prevailed among the White and Colored Troops of the U. S. Army.

DISEASES.	WHITE TROOPS.		COLORED TROOPS.	
	Cases.	Deaths.	Cases.	Deaths.
Average annual rate for all diseases	2,434.64	53.48	3,298.96	143.4
Continued Fevers	40.29	11.60	22.99	12.45
Typho-malarial Fevers	22.38	1.68	41.05	6.78
Malarial Fevers	522.34	3.36	829.58	10.03
Diarrhœa and Dysentery	711.46	15.62	839.38	35.27
Diphtheria	3.92	.34	4.23	.32
Eruptive Fevers	46.61	4.50	92.29	18.36
Other Miasmatic diseases	78.31	1.03	132.30	2.99
Total Miasmatic diseases	1,414.22	38.09	1,961.82	86.21
Syphilis, Gonorrhœa and Orchitis	82.04	.06	77.74	.17
Scurvy	13.78	.16	88.43	2.02
Rheumatism, acute and chronic	114.33	.20	178.54	1.23
Consumption	6.06	2.18	7.26	6.31
Itch	14.40	.....	17.21	.....
Diseases of Nervous System	76.31	1.84	130.51	4.25
Diseases of Eye and Ear	52.79	.004	52.78	.01
Diseases of Circulation	11.27	.69	8.50	2.44
Acute Bronchitis	174.49	.49	177.30	1.36
Inflammation of Lungs and Pleura	41.76	6.34	127.09	28.87
Other diseases of Respiratory Organs	45.55	.57	50.34	2.12
Total diseases of Respiratory Organs	261.80	7.40	354.74	32.35
Diseases of Digestive System	252.79	1.71	295.92	5.06
Urino-genital diseases	13.41	.18	16.45	.68
Diseases of Bones and Joints	3.63	.02	5.18	.08
Boils, Abscesses and other Integumentary diseases	85.19	.09	64.12	.14

cases of the continued fevers was only 22.99 among the colored men, while it reached 40.29 among the white troops. Nevertheless, the annual death rate from these fevers, typhoid mainly, was somewhat larger among the colored men, 12.45, than the white commands, 11.60; thus indicating the unlikely coincidence of a diminished prevalence and a largely augmented virulence. This anomaly is probably due to the aggregation of a larger proportion of true typhoid cases in the 41.05 cases reported as typho-malarial from the colored commands than in the 22.38 cases similarly reported from the white regiments. Diarrhœa and dysentery, the eruptive fevers, diseases of the lungs—in fact, with the partial exception of the continued fevers, all the diseases that were specially prevalent in our camps occasioned more sickness and more deaths among the colored troops than among corresponding numbers of the white troops. Miasmatic diseases as a class caused 1,961.82 cases and 86.21 deaths, as compared with 1,414.22 cases and 38.09 deaths among the whites. Even those, such as

* See *infra*, page 84, in continuation of this subject.

syphilis, gonorrhœa and orchitis, consumption, diseases of the eye and ear, diseases of the circulation and acute bronchitic attacks, which were not of more frequent occurrence among the colored troops were, nevertheless, attended with a higher mortality than among the whites.*

SICK- AND MORTALITY-RATES OF U. S. WHITE TROOPS DURING THE WAR AS COMPARED WITH THOSE OF OTHER BODIES OF MEN OF THE MILITARY AGE.—Table IV and the plate which faces this page have been designed to illustrate the various points that appear of interest under this heading. Special attention may be invited to some of the more prominent of these.

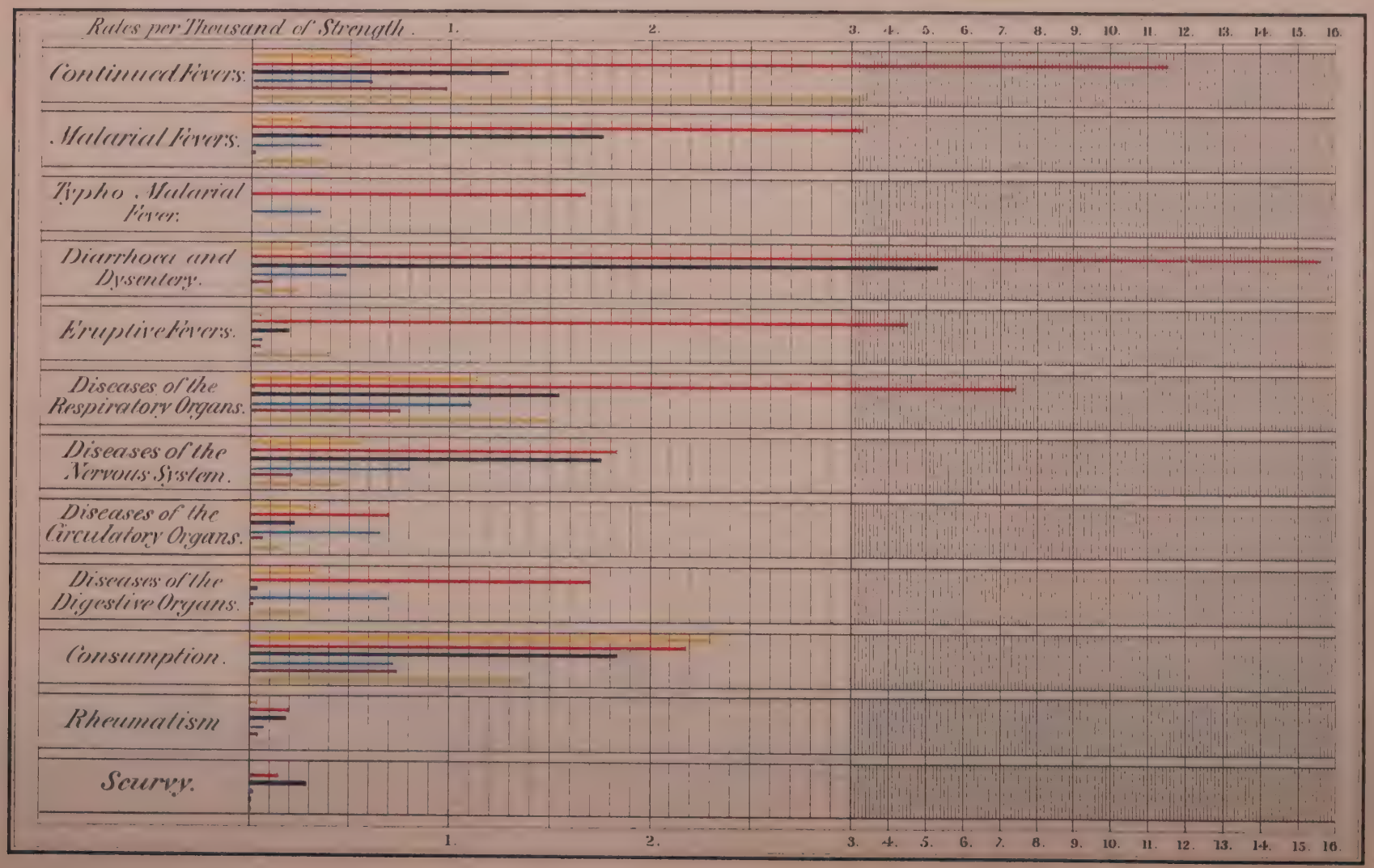
Five of the red lines representing annual mortality rates among our white troops during the war are projected into the closed-up divisions of the plate. Evidently the diseases indicated by them caused the main portion of the total mortality. The length of these lines as compared with that of the correlated lines of other colors, gives expression to the influences which the conditions of war impressed on the mortality from these affections. The diseases thus prominently brought into notice are those already recognized in Table II as having occasioned so many of the deaths among our soldiers. Of the 53.48 deaths that occurred annually in every thousand men of the average strength present, diarrhœa and dysentery caused 15.62; the continued fevers, not including those reported as typho-malarial, 11.60; diseases of the respiration, pneumonia chiefly, 7.40; the eruptive fevers, 4.50; and the malarial fevers, 3.36. The only other lines that are projected into the denser portion of the plate are the black line indicating the mortality, 5.32, from diarrhœa and dysentery among our troops before the war, and the green line representing that from the continued fevers, 3.39, among the French troops. The former was due to that want of sanitary supervision and care for the health of the troops which permitted scurvy to show as a well-defined cause of death among them, while it scarcely appears among the other bodies of men tabulated, except in our own armies during the war, when the unusual nature of the conditions suffice to explain, and in a measure to condone, its appearance. The latter was due to the influence of local epidemics during the years taken for comparison, and especially to the prevalence of continued fevers among the troops in Algeria.

The increased mortality during the war from what has been called typho-malarial fever is well marked by comparison with the death rate from the same disease since the war; but, as will be shown hereafter, febrile cases presenting essential differences were aggregated under this heading.

The large death rate, 11.60 per thousand of strength, from the continued fevers during the war period, when compared with their relatively insignificant mortality in our army since the war, 0.61, in the German army, 0.98, or among our civil population of the military age, 0.49, implies of necessity a vastly increased prevalence as well as fatality. Both of these facts may be verified from the data in Table IV. A precisely analogous series of facts delineated under the heading of the eruptive fevers is suggestive of one of the probable causes of the increased prevalence and fatality of the continued fevers. The main factor in the development of an epidemic of the eruptive fevers is not so much the introduction of the contagion, although this of course is essential, but the accumulation in the population of a sufficient number of susceptible individuals to afford material for the

* This tendency of the colored troops to succumb to morbific influences was brought forcibly to the notice of the writer in 1864 by Assistant Surgeon J. T. CALHOUN, U. S. Army, then in charge of a field hospital for their treatment at City Point, Virginia. "I do not know what to do with these colored men," he said, "I cannot keep them up. They do not have the stamina of our white men. They just go to their beds and die."

A Comparison of the Annual Mortality Rates caused by certain Specified Diseases in Various Bodies of Men of the Military Age.



operation of the morbid agency. This is well recognized by the recurrence of the epidemic visitation after a certain lapse of time has permitted the community to accumulate a large proportion of persons hitherto unaffected; and in the case of small-pox, by the institution of effective preventive measures based on the destruction of the susceptibility rather than on the exclusion of the contagion. Regiments recruited in country districts that had been unvisited by these fevers for a number of years, presented material for their rapid spread on the introduction of the contagious principle. Similarly, regiments from localities that had been free from typhoid, were liable to suffer severely from this disease on account of the susceptibility of the men composing them.

The mortality lines of our armies during the war period are exceeded by those of other bodies of men in the two instances, consumption and scurvy. The males of our civil population have a higher death rate from the first-mentioned disease as a result of the selection for service and discharges for disability that tended to free the army from such cases. Our own troops, before the war, had a higher rate from scurvy, owing to deficient supplies and their isolation at stations at and beyond the frontier of civilization.

Diseases of the digestive system gave a larger mortality among our troops during the war than among other bodies of men. The records show this to have been mainly due to the fatality of cholera morbus and dropsy from hepatic disease.

Diseases of the nervous system had also a comparatively large mortality, which, however, was equalled in our own army before the war.

Active service during the war slightly increased the mortality from diseases of the circulatory system; but the records of the French army ascribe to these diseases a nearly similar death rate.

Rheumatism contributed but little to the mortality in our ranks, scarcely more than was the result of the conditions existing at the military posts of earlier times.

From Table IV, on the next page, may be gathered some interesting points regarding prevalence not shown by the mortality lines.

Thus, according to the figures, the number of cases of sickness among our troops was relatively greater before the war than during its progress. Certainly, in its early service in the Indian country, our small army was exposed to many of the influences that subsequently contributed to the war rates of sickness. It will be observed, however, that the number of serious cases, *i. e.*, of diseases yielding a high mortality, was invariably greater during the war than before it; hence the smaller figures of which our war rates consists. 2,434.64 cases annually per thousand of strength as against 2,880.01 in earlier years, must be attributed to the failure of our medical officers during the active progress of a campaign to record cases of trivial ailments rather than to an actual diminution in their number.

Again, the frequency of cases of disease in our army since the war appears to have been more than double that of the German army during corresponding years of peace, 1,474.26 per thousand of strength as compared with 660.78. Here the gravity of the affection recorded as a case of sickness forms an element of difference. In our service every man excused from military duty on account of sickness, however trivial, counts as one case upon the record; but since the mortality rate of the German army is not decreased in proportion to its sickness, as compared with our rates, it may be inferred that in their service the trivial cases are not recorded.

TABLE IV.

Average Annual Sick and Death Rates per thousand of mean strength in the U. S. Army before, during and since the war, and in the German and French armies, with the Annual Death Rate for males of the military age in the United States, as calculated from the returns of the census year 1880.

	White male population, 20 to 44 years of age, in certain parts of the United States.(a)	Total male population of the United States, white and colored, 20 to 44 years of age.(b)	U. S. Army, White Troops for 5½ years of War.		U. S. Army, White Troops for 18 years before the War (c)		U. S. Army, White Troops for 10 years since the War.		German Army for four years, 1874–'5 to 1877–'8.(d)		French Army for four years, 1875–'78.(e)
Strength represented	1,906,276	8,987,358	431,237		10,397				324,195		459,420
	Deaths.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Deaths.
Average annual rate for all diseases	6.97	6.87	2,434.64	53.48	2,886.01	18.98	1,474.26	6.74	660.78	4.38	8.78
Continued Fevers	.49	.54	40.29	11.60	21.30	1.29	3.23	.61	14.35	.98	3.39
Typho-malarial Fevers			22.38	1.68			2.58	.34			
Malarial Fevers	.19	.26	522.34	3.36	596.63	1.76	226.68	.32	24.70	.009	.38
Diarrhœa and Dysentery	.22	.27	711.46	15.62	457.34	5.32	224.56	.47	21.88	.10	.26
Diphtheria	.04	.05	3.92	.34			.55	.02	1.18	.04	.05
Eruptive Fevers	.09	.06	46.61	4.50	7.48	.19	2.61	.06	4.86	.07	.39
Other Miasmatic Diseases			78.31	1.03	(f)	(f)	(f) 8.48	(f) .13			
Total Miasmatic Diseases			1,414.22	38.09	1,112.74	8.56	468.89	1.96	67.07	1.20	4.48
Syphilis, Gonorrhœa and Orchitis	.02	.02	82.04	.06	87.86	.08	87.62	.05	41.56	.006	.004
Scurvy			13.78	.16	26.37	.28	.42	.005	.10	.009	.004
Rheumatism, acute and chronic	.04	.04	114.33	.20	114.33	.18	116.54	.06	26.21	.05	.09
Consumption	2.94	2.33	6.06	2.18	3.53	1.84	4.08	.72	3.77	.74	
Itch			14.40				.29		7.75		
Diseases of Nervous System	.64	.56	76.31	1.84	82.26	1.77	111.52	.79	4.17	.21	.48
Diseases of Eye and Ear			52.79	.004	59.04	.01	34.42	.005	41.08	.02	.004
Diseases of Circulation	.46	.33	11.27	.69	3.04	.23	7.70	.67	2.10	.06	.18
Acute Bronchitis	.08	.05	174.49	.49	299.59	.19	208.83	.06	43.64	.03	.18
Inflammation of Lungs and Pleura	.77	.97	41.76	6.34	27.28	1.36	10.54	.84	17.61	.72	1.02
Other Diseases of Respiratory Organs	.13	.12	45.55	.57			11.42	.20			.32
Total Diseases of Respiratory Organs	.98	1.14	261.80	7.40	326.87	1.55	230.79	1.10	61.25	.75	1.51
Diseases of Digestive System	.35	.32	252.79	1.71	128.46	.04	191.20	.69	30.82	.009	.29
Urino-genital Diseases	.33	.18	13.41	.18			15.44	.24	6.34	.08	.04
Diseases of Bones and Joints	.04	.03	3.63	.02			3.92	.03	7.13	.06	.09
Boils, Abscesses and other Integumentary Diseases.	.04	.05	85.19	.09	129.91	.10	118.09		42.78	.006	

(a) The mortality returns of the Tenth U. S. Census, 1880, were not published at the time this table was calculated; but by the courtesy of the Superintendent the writer was furnished with page proofs of Table XI, *Statistics of Mortality*, giving the deaths in certain grand groups by age and sex, with distinction of color and specification of cause, from which he calculated the rates for his comparative table of annual rates in men of the military age. The grand groups, Nos. 2, 8 and 11 of the topographical divisions made by the Census Office, have a population of 1,906,276 white males between and including the ages of 20 and 44 years. They are: 2, the Middle Atlantic Coast, comprising the District of Columbia, the State of Delaware, and part of New York, New Jersey, Maryland and Virginia; 8, the Interior Plateau, embracing parts of New York, Pennsylvania, Virginia and North Carolina; and 11, the Southern Interior Plateau, including parts of South Carolina, Georgia, Alabama, Mississippi and Tennessee.

(b) The figures in this column were calculated from page proofs of Table VII of the *Statistics of Mortality* of the Tenth Census, which gives the mortality of the United States from each specified disease and class of diseases, with distinction of age and sex but not of color.

(c) The average rates in this column are from the statistics of the years 1840 to 1859 inclusive, but not including the years 1847 and 1848, during which the troops were on active service in Mexico. Yellow fever and cholera prevailed during certain of these years, but the influence of these epidemics has been excluded in calculating the rates. There were 317 deaths from yellow fever and 764 from cholera, which, if included, would raise the average annual death rate from 18.98 to 24.72.

(d) These rates were calculated from the *Statistischen Sanitätsbericht über die Königlich Preussische Armee*. Care was taken in the computation to so aggregate the figures given under specified diseases as to render them strictly comparable with the United States statistics.

(e) As the French *Statistiques Médicales de l'Armée* do not report the number of men excused from duty and treated in quarters, their recorded cases are not susceptible of comparison with those of the United States or German army.

(f) Not including yellow fever.

Notwithstanding the great frequency of malarial attacks during the war, 522.34 cases annually per thousand of strength, it will be observed that these were even of greater frequency among our troops during the years that preceded it, 596.63 per thousand. The material reduction of late years in malarial sickness, 226.68 per thousand, is due to the abandonment of unhealthy stations.*

Venereal diseases and those affecting the urino-genital organs were nearly as frequent in our army during the war as in earlier years.

Scurvy during the war gave annually per thousand of strength 13.78 cases, or only about one-half of the number, 26.37, recorded by our medical officers before the war.

The war records, compared with those of our army before and since the war, do not show an increased prevalence of rheumatism, nor of diseases of the nervous system, nor of bronchitic attacks; pneumonic cases, however, were more frequent and by far more fatal.

Diseases of the circulation were somewhat increased, and those of the digestive system considerably augmented in number during the period of the war.

SICKNESS AND MORTALITY AS INFLUENCED BY SEASON, LOCALITY, ETC.—The regimental monthly reports, compiled from the morning reports of the medical officers on duty, are the ultimate elements of which the statistics of sickness and death in our armies were composed; but these lost their individuality when they were converted into departmental returns. The data in these departmental tables were intended to show, when converted into comparative figures, the influence of season, locality and military operations as affecting the prevalence and fatality of the diseases specified. The influence of season can be determined with accuracy, but that exercised by locality and military operations is not so well defined.

A series of regimental histories giving in parallel sentences an account of the conditions affecting the health of the men during the progress of their service, and the prevalence of disease and death among them, would have been a desirable addition to the materials for a medical history of the war. The want of these has been in part replaced by the special reports rendered by medical officers, although generally in these more attention was given to the details of hostile movements, battle scenes and surgical service, than to the less exciting contests with the more deadly enemy, disease. By the consolidation of the regimental into departmental returns the numerical statements lost a great part of their value. Certain sections of the departments were healthy, others unhealthy, and the consolidation of the regimental reports obliterated the records of special localities and gave results for each department depending on the character of that section of it in which the majority of the regiments were concentrated. Besides this, even the boundary lines of departments were subject to constant variation consequent on changes in the military policy, the assignment of new commanders, etc. Departmental reports must therefore be considered in connection with the localities which were the theatre of military operations, rather than as figures applying generally to the section of country included in the department. This renders it difficult to attain to an accurate estimate of the relative value of region as influencing disease and mortality.

Moreover, military operations carried the troops from one part of a department to another, and frequently to some other department. They entailed upon the soldier fatigues, exposures and privations which tended to sickness and death. The pernicious influences of service in one department came thus in many instances to be credited to a wholly different locality. A synopsis of the history of the operations in each department precedes the annual

* See *supra*, p. 10.

statistical tables in the First Part of this work, and many of the movements and the influences exercised by them have already been given in free extracts from the reports of the medical officers who served with the commands. Nevertheless, it will readily be appreciated that the ratios of disease and death calculated from the figures in the departmental tables express only in a general way the conjoint influence of locality and military operations.

The following table presents a general view of the annual movement of sickness and death among the white and the colored troops in the several regions:

TABLE V.

Showing the Annual Prevalence of Sickness and the Mortality from Disease in the several Regions, expressed in ratios per 1,000 of mean strength.

	For the year ending June 30th—											
	1861.		1862.		1863.		1864.		1865.		1866.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
White Troops.												
Atlantic Region	3,930	11.4	2,719	32	2,553	42	2,137	33	2,221	53	2,292	42
Central Region	3,432	7.2	3,495	81	2,841	85	2,262	58	2,328	61	2,549	48
Pacific Region	.....	.....	2,171	10	2,133	9	1,816	11	1,864	12	1,749	14
Total white	3,822	10.8	2,983	49	2,696	63	2,210	48	2,273	56	2,362	42
Colored Troops.												
Atlantic Region	.....	.....	.....	.....	.....	.....	3,461	83	3,122	111	2,574	100
Central Region	.....	.....	.....	.....	.....	.....	4,373	269	3,248	156	2,842	93
Total colored	.....	.....	.....	.....	.....	.....	4,092	211	3,205	140	2,797	94

The commencement of service was in all instances characterized by the highest ratio of sickness.

Among the white troops the first year gave a mortality rate as low as 10.8 per thousand of strength; but this rate is calculated on observations covering only the months of May and June, as the troops were being hastily called into service. The third year, ending June 30, 1863, gave the highest death rate, 63 per 1,000. The rate fell to 48 in the fourth year, and rose to 56 in the fifth year. In the year following the war the sick rate preserved its war height, but the mortality fell to 42.

Among the colored troops the sick rate fell from 4,092 during the first year of their service to 2,797 during the last, and the death rate from 211 to 94.

The rates in the Pacific region corresponded with those in the army as a whole since the war. The troops in that region were, in fact, during the war exposed to no greater fatigues or privations than the army encountered when at the close of the war it was distributed over the west.

The high death rate of the troops in the Central region is one of the chief points developed by this table. In this region during the year of greatest prevalence the deaths were to the cases as 1 : 43, and during the year of least prevalence as 1 : 39. In the Atlantic region, omitting the figures for 1861 as representing only a part of a year, the corresponding proportions were 1 : 85 and 1 : 65. The fatality rates or the deaths in a given number of cases, as well as the mortality rates or the deaths in a given number of men, were greater in the Central than in the Atlantic region. Unfortunately it is impossible to learn precisely in which of the departments of the Central region this large excess of deaths

took place. The statistical tables in the First Part of this work record the deaths which occurred among the troops serving in each department; but the deaths that occurred in the general hospitals among soldiers of one department are consolidated with those of men belonging to other departments in a series of tables giving the deaths in the general hospitals of the region. We must, therefore, endeavor to appreciate the influence of locality on the mortality by an examination of its influence on the prevalence of disease. The following table was constructed to facilitate this examination:

TABLE VI.

Showing the Annual Prevalence of Sickness from all Diseases in the several Military Departments, expressed in ratios of 1,000 strength.

WHITE TROOPS.	FOR THE YEAR ENDING JUNE 30TH—					
	1861.	1862.	1863.	1864.	1865.	1866.
	Cases.	Cases.	Cases.	Cases.	Cases.	Cases.
Middle Department		3,099	2,117	2,002	2,363	
Department of the Shenandoah		2,201				
Army of the Potomac		2,844	2,609	1,563	1,963	
Department of the Rappahannock		2,204				
Department of Virginia		2,432	2,583	2,823	2,729	
Department of North Carolina		2,410	2,985	4,012	3,110	
Department of the South		3,095	2,249	2,796	2,395	
Department of the East			2,335	2,217	2,219	
Department of Washington			2,524	2,401	2,273	
Middle Division					1,788	
Atlantic Region	3,930					2,292
Total in Atlantic Region	3,930	2,719	2,553	2,137	2,221	2,292
Department of Western Virginia		2,802	2,005	1,293		
Department of the Cumberland		3,415	2,936	1,747		
Department of Tennessee		3,991	2,858	2,614		
Department of the Gulf		3,855	3,996	2,923	2,703	
Department of the Northwest		2,889	2,394	2,035	2,109	
Department of Missouri		3,301	2,296	2,249	2,494	
Northern Department			3,383	3,029	2,508	
Department of the Ohio			2,202	1,931		
Department of Arkansas				2,829	3,428	
Military Division of the Mississippi, Part I					2,361	
Military Division of the Mississippi, Part II					1,688	
Central Region	3,432					2,549
Total in Central Region	3,432	3,195	2,841	2,262	2,328	2,549
Department of New Mexico		1,738	2,218	1,693	1,658	
Department of the Pacific		2,575	2,076	1,999	1,964	
Pacific Region						1,749
Total in Pacific Region		2,171	2,133	1,816	1,864	1,749
Army of the United States	3,822	2,983	2,696	2,210	2,273	2,302

Perhaps the first point that will attract attention in this table is the gradual diminution in the sick rates as the war progressed. The years of the war, though nominally five, were in reality but four, that ending June 30, 1861, having embraced only two months of service. In a general way, as may be seen by the regionic or army totals, the rate of sickness decreased during the first three years and became somewhat increased during the fourth year. Locality had nothing to do with this except in so far as in some instances to occasion an exception to the general rule, as in the Departments of Virginia and North Carolina, where the sickness increased progressively during the three years on account of continued exposures in malarious sections. The diminished sick rate must be attributed to the weeding out by death and discharge for disability of the inferior material necessarily present in all new levies. The term of service of many of the regiments expired during the third year of the war, when the hardy veterans composing them were in many instances replaced by raw troops who, in becoming inured to active service, swelled the sick rates during the fourth year.

The lowest rate, 1,293, was furnished during the third year by the high grounds of Western Virginia. The low rate of 1,563 was given during the same year by the veterans of the Army of the Potomac. The battle of Gettysburg began the year, and the desperate struggle that led from the Wilderness to Petersburg during May and June, 1864, ended it; but the greater portion of this period was spent in what was regarded by the troops as a picnic in summer quarters on the Rapidan, or hutted during the succeeding winter and spring in a healthy locality. All the conditions were favorable to a light sick report. Many of the men were anticipating a sojourn at home on the expiration of their term of service. Even the exhausting movements which closed the year, the constant skirmishing, and the battles fought in quick succession at the Wilderness, Spottsylvania, the North Anna, Cold Arbor and Petersburg, while undoubtedly the cause of much sickness, tended to reduce the sick rate as preserved on the records which medical officers made up at intervals from memory or pencilled notes, overlooking the slighter ailments that would have been recorded in quieter times and noting only those more serious cases that had been despatched with the wounded to the general hospitals.

The highest rate, 4,012, was furnished during the third year by the continued exposure of the troops in the malarious regions of the Department of North Carolina.

The high mortality rates in the Central region corresponded with high sick rates which are particularly displayed in the reports from the Departments of the Tennessee and the Gulf. The prevalence as well as the virulence of the morbific influences was greater in the Central than in the Atlantic region. The influence of locality on the prevalence of particular diseases will be discussed in the chapters relating to the diseases in question.

To express the relation of season to sickness and mortality in the various regions, and in the army as a whole, Tables VII, VIII, IX and X have been constructed; but, as it is a work of some labor to gather from such tables the relative value of the figures contained in them, the diagram facing page 24 has been prepared, and to it accordingly attention is invited.

The sickness is expressed in monthly rates per thousand of strength on the left side of the plate and the mortality on the right; but the scales have been so proportioned that the sick rate may be read as well on the right by appending a cipher to the printed numbers. The narrow red line represents the sick rate among the white troops of the army, the broader line the death rate, while the yellow lines indicate the correlated figures for the colored troops.

Monthly Death Rates among White Troops from

1. *All diseases,* 2. *Diarrhoea and dysentery,* 3. *Typhoid fever,*
4. *All malarial fevers,* 5. *Inflammation of the lungs and pleuræ.* 6. *Eruptive fevers.*

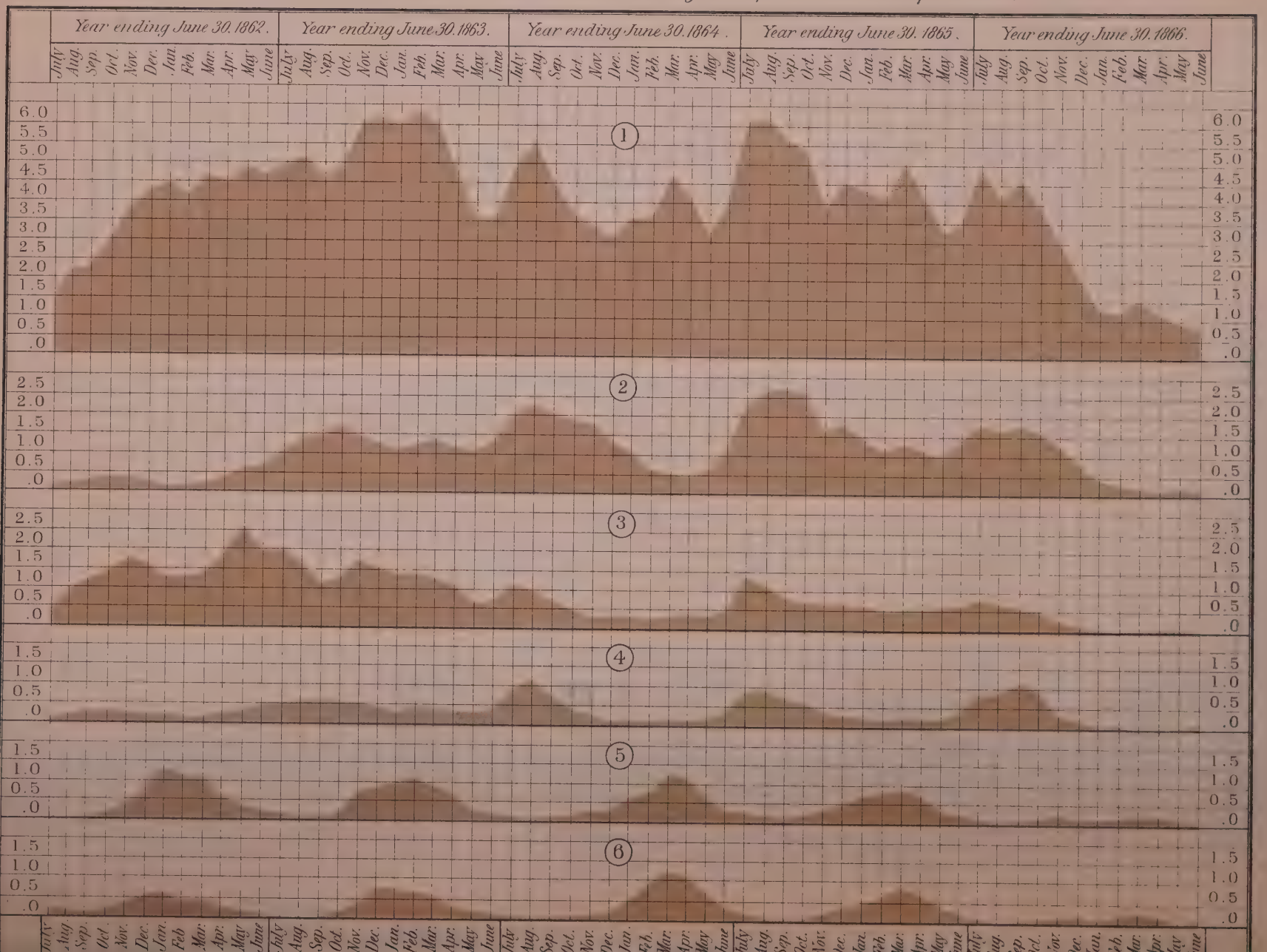

Year ending June 30. 1862.
Year ending June 30. 1863.
Year ending June 30. 1864.
Year ending June 30. 1865.
Year ending June 30. 1866.
July Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June
1
6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 .0
2
2.5 2.0 1.5 1.0 0.5 .0
3
2.5 2.0 1.5 1.0 0.5 .0
4
1.5 1.0 0.5 .0
5
1.5 1.0 0.5 .0
6
1.5 1.0 0.5 .0

TABLE VII.

Monthly ratio of Sickness per 1,000 of mean strength among the White Troops, U. S. Army, by regions, for the period from June 30, 1861, to June 30, 1866.

YEAR ENDING—	REGION.	JULY.	AUGUST.	SEPTEMBER.	OCTOBER.	NOVEMBER.	DECEMBER.	JANUARY.	FEBRUARY.	MARCH.	APRIL.	MAY.	JUNE.	MONTHLY AVERAGE FOR THE YEAR.
June 30, 1862	Atlantic	385	370	297	268	257	232	201	184	167	206	198	227	227
	Central	283	389	346	326	303	315	348	253	261	294	269	252	291
	Pacific	157	193	200	197	230	154	128	205	194	141	226	187	181
	Total	324	364	306	285	271	257	239	202	195	245	233	239	249
June 30, 1863	Atlantic	311	235	239	285	240	228	222	181	180	149	163	158	213
	Central	245	220	263	270	263	244	256	236	240	210	192	219	237
	Pacific	186	256	215	172	181	159	172	146	152	169	154	181	178
	Total	279	228	250	275	251	235	238	209	211	182	179	196	225
June 30, 1864	Atlantic	184	244	234	197	176	151	148	135	158	166	147	206	178
	Central	238	268	222	192	169	143	153	138	169	168	190	227	188
	Pacific	178	161	175	186	190	158	140	113	142	138	134	124	151
	Total	217	257	226	194	172	146	151	137	164	167	174	218	184
June 30, 1865	Atlantic	269	276	235	212	189	168	158	140	141	136	170	181	185
	Central	258	263	230	195	160	174	165	146	179	176	183	190	194
	Pacific	132	143	145	159	154	144	160	153	159	189	162	166	155
	Total	260	265	230	201	172	171	162	144	162	158	177	185	189
June 30, 1866	Atlantic	199	214	227	223	177	150	113	124	142	149	188	207	191
	Central	232	253	246	224	185	144	138	134	154	137	170	224	212
	Pacific	149	160	166	183	154	149	113	96	136	141	155	146	146
	Total	215	233	232	219	177	147	125	123	146	142	172	199	197

TABLE VIII.

Monthly ratio of cases of Sickness per 1,000 of mean strength among the Colored Troops, by regions, for the period from June 30, 1863, to June 30, 1866.

YEAR ENDING—	REGION.	JULY.	AUGUST.	SEPTEMBER.	OCTOBER.	NOVEMBER.	DECEMBER.	JANUARY.	FEBRUARY.	MARCH.	APRIL.	MAY.	JUNE.	MONTHLY AVERAGE FOR THE YEAR.
June 30, 1864	Atlantic	292	517	569	403	294	274	257	247	286	228	253	278	288
	Central	494	441	410	430	388	342	333	301	347	363	346	377	364
	Total	459	458	451	422	361	323	309	282	328	319	317	342	341
June 30, 1865	Atlantic	341	349	298	293	234	226	289	219	208	177	292	264	260
	Central	356	364	343	284	255	249	227	206	234	241	259	261	271
	Total	351	359	328	287	248	241	252	211	224	216	271	262	267
June 30, 1866	Atlantic	270	231	264	251	198	154	168	152	161	122	92	154	215
	Central	311	316	286	280	203	185	165	158	141	129	125	157	237
	Total	300	298	282	275	202	181	165	157	145	127	120	157	233

TABLE IX.

Monthly ratio of Deaths from disease per 1,000 of mean strength among the White Troops, U. S. Army, by regions, for the period from June 30, 1861, to June 30, 1866.

YEAR ENDING—	REGION.	JULY.	AUGUST.	SEPTEMBER.	OCTOBER.	NOVEMBER.	DECEMBER.	JANUARY.	FEBRUARY.	MARCH.	APRIL.	MAY.	JUNE.	MONTHLY AVERAGE FOR THE YEAR.
June 30, 1862	Atlantic	1.95	2.04	1.78	2.01	2.66	3.23	2.90	2.40	2.52	3.12	2.85	3.00	2.67
	Central	.97	2.82	3.49	4.55	6.20	6.58	8.84	8.82	10.24	6.37	7.18	6.42	6.76
	Pacific	1.33	.89	1.26	1.21	1.60	1.00	.19	.41	.88	.49	.51	.77	.88
	Total	1.49	2.15	2.21	2.82	3.79	4.29	4.52	4.11	4.79	4.58	4.33	4.63	4.11
June 30, 1863	Atlantic	3.89	5.19	4.06	4.52	4.76	4.69	3.88	3.08	2.74	2.04	1.44	1.65	3.47
	Central	6.62	5.55	5.36	5.60	7.48	8.00	8.09	9.67	9.35	7.09	5.17	4.59	7.07
	Pacific	.72	.55	.56	.79	1.02	.81	.49	1.02	.32	1.15	.70	1.03	.76
	Total	4.96	5.25	4.58	5.01	6.09	6.21	5.93	6.39	6.11	4.76	3.52	3.56	5.27
June 30, 1864	Atlantic	2.45	2.74	2.63	3.02	2.51	2.46	3.03	2.63	3.51	2.05	1.87	2.93	2.73
	Central	6.67	7.53	5.84	4.18	4.06	3.50	3.94	4.25	5.51	4.98	3.92	4.41	4.87
	Pacific	.33	.65	.63	.94	1.00	1.28	1.25	1.28	1.01	1.08	.71	.81	.93
	Total	4.97	5.60	4.51	3.71	3.44	3.10	3.58	3.61	4.71	4.13	3.12	3.82	4.02
June 30, 1865	Atlantic	5.54	6.75	5.16	5.76	3.87	4.90	3.80	3.51	4.38	3.33	3.08	3.95	4.44
	Central	6.82	6.10	6.05	5.35	3.96	4.41	5.00	4.75	5.89	5.04	3.48	3.28	5.06
	Pacific	.65	.65	.53	1.08	.58	1.41	.88	1.30	1.11	1.63	1.17	.91	.99
	Total	6.17	6.25	5.58	5.46	3.86	4.57	4.41	4.11	5.11	4.15	3.24	3.53	4.71
June 30, 1866	Atlantic	5.06	3.62	4.26	4.42	3.05	1.84	1.24	1.06	1.84	1.14	1.05	.90	3.52
	Central	5.07	4.72	5.42	4.46	3.44	2.66	1.79	1.38	1.66	1.31	1.06	.82	4.01
	Pacific	.98	.99	1.39	1.09	1.98	1.49	.93	1.11	.85	.95	.77	.70	1.13
	Total	4.92	4.10	4.62	4.07	3.07	2.15	1.43	1.22	1.54	1.19	.99	.82	3.51

TABLE X.

Monthly ratio of Deaths from sickness per 1,000 of mean strength among the Colored Troops, by regions, for the period from June 30, 1863, to June 30, 1866.

YEAR ENDING—	REGION.	JULY.	AUGUST.	SEPTEMBER.	OCTOBER.	NOVEMBER.	DECEMBER.	JANUARY.	FEBRUARY.	MARCH.	APRIL.	MAY.	JUNE.	MONTHLY AVERAGE FOR THE YEAR.
June 30, 1864	Atlantic	2.52	4.58	7.40	7.08	4.48	7.31	7.54	9.03	9.41	6.32	5.77	5.77	6.90
	Central	29.19	31.40	31.02	32.63	16.84	15.40	18.48	20.24	22.16	25.52	21.38	20.75	22.44
	Total	24.15	25.31	24.91	25.09	13.22	13.12	15.09	16.41	18.07	19.25	16.54	15.40	17.60
June 30, 1865	Atlantic	8.60	7.38	8.89	8.62	6.67	6.76	9.08	13.75	10.35	8.36	11.23	13.31	9.23
	Central	20.50	18.50	16.87	13.39	10.01	10.96	15.24	12.14	12.11	10.33	10.70	9.40	12.60
	Total	16.75	14.79	14.54	11.63	8.81	9.33	12.77	11.99	11.45	9.55	10.89	10.64	11.66
June 30, 1866	Atlantic	8.71	7.24	8.59	12.09	7.15	5.18	8.26	6.78	7.45	4.64	4.21	2.91	8.30
	Central	9.50	9.52	7.80	7.92	4.62	4.26	6.74	6.62	8.07	7.56	3.00	3.56	7.72
	Total	9.32	9.01	8.02	8.62	6.23	6.96	6.91	6.63	7.97	6.99	3.18	3.41	7.82

The largest monthly ratio of cases among the white troops occurred in August, 1861, shortly after the enlargement of the army to meet the military necessities of the time. This ratio amounted to 364 cases per thousand of strength. The exposures, fatigues, altered diet and other changes in the conditions affecting the men incident to their new mode of life as soldiers, coincided at this time with the period of greatest annual prevalence of malarial disease, and the large amount of sickness indicated by this ratio was the result. A reference to the diagram showing the prevalence of diarrhœa and dysentery* will manifest the great influence that this class of camp diseases exercised on the general sick rate of the army at this time. Their extensive prevalence in the Atlantic and Central regions, in which most of the troops were massed, contributed much to the height of the general sick wave as shown on the diagram under present consideration, or more especially on Table VII, which it illustrates.

The irregular prominence of the line in April, July and October, 1862, appears due to excess of diarrhœal cases,—in the Central region during the first-mentioned month, and in the Atlantic region during the others. As diarrhœa, dysentery and the malarial fevers occasioned more than one-half of all the cases of disease, 507 of every thousand cases† that were reported from the white commands, the concurrence of their periods of maximum prevalence gives prominence in the autumnal months of subsequent years to the line indicating the prevalence of disease in general. But in none of these years did the monthly ratio at all approach the height reached during the autumn of the year 1861: thus the highest ratio recorded in 1862 was that of July, 279, while August, in the three following years, gave the highest monthly rates, respectively 256, 265 and 233 per thousand of strength.

The minimum as well as the maximum of prevalence in the year ending June 30, 1862, was higher than in the subsequent years. This is attributable mainly to the frequency of diseases of the respiratory organs and to diarrhœas, which continued to affect the troops in the Central region, and but little to the malarial influence which in this year, as will be seen hereafter,‡ was at its minimum. The minima of the several years were as follows: 195 in March of 1862, 179 in May of 1863, and 137, 144 and 123 respectively in February of the three following years.

Speaking generally, the amount of sickness among the white troops was much less in the last year than in the first, the average monthly rate of the latter, 249, being greater than the highest monthly rate of the former, 233 per thousand. A glance at the diagram will, however, show these variations in the level of the rates more satisfactorily than a lengthened description. It may be added that the narrow red line, the subject of the foregoing remarks, corresponds closely in its course with that indicating the prevalence of disease among the white troops in the Atlantic region. The rates of the Central region, when plotted diagrammatically, give a line which runs parallel to the red line but on a somewhat higher level. The rates of the Pacific region, when delineated in this manner, occupy a lower level, and fail to manifest in their irregularities the existence of the marked autumnal elevations which form so striking a feature of the lines for the other regions.

The mortality from all diseases among the white troops, represented on the diagram by the thicker red line, increased from a low rate during the first month to its maximum, 6.39, in February, 1863. After this it fell during March and April to 3.5 in May and

* Facing page 22 of the Second Part of this work. † See Table II, *supra*. ‡ See diagram facing page 90, *infra*.

June. The line is very irregular in the remainder of its course; but in each of the subsequent years there may be distinguished a large autumnal and a smaller spring elevation, the latter usually occurring during the month of March. The plate facing page 20 affords a satisfactory explanation of most of these irregularities in the level of the mortality line. The sudden rise in the rate during the autumn of 1861 was due almost wholly to typhoid fever, but in November and December of that year and January, 1862, pneumonia and the eruptive fevers aided considerably in its elevation. The mortality from typhoid fever continued to augment and uphold the general death rate, although the former allies of this disease declined in virulence as the spring advanced. Meanwhile diarrhœa, and a little later the malarial fevers, began to contribute materially to the rate. During the period from November, 1862, to March, 1863, when the monthly death rate amounted to about 6 per thousand of strength, all the diseases delineated formed notable percentages of the total. In the subsequent years the autumnal increase corresponded with larger rates from diarrhœa, typhoid and malarial fevers, while the smaller prominences in the spring months were caused by a maximum rate among the pneumonic cases and eruptive fevers, with a large minimum rate among the diarrhœal diseases and typhoid fever.

But to return to the diagram on the opposite page: The sick rate of the colored troops, indicated by the thin yellow line, was highest immediately after their enrollment in 1863, when nearly one-half of the command was reported as having been taken sick during each of the months July, August and September. Autumnal exacerbations were encountered during each of the subsequent years; but on the whole the health of these troops improved so remarkably that during the last quarter of the year ending June 30, 1866, their sick rates were somewhat lower than those of the white troops.

Their death rates, indicated by the heavier yellow line, followed a generally parallel course—high at first, about 25 per thousand of strength monthly during the first four months of service, and afterwards declining to the minimum of 3.18 per thousand in May, 1866; but at no period of their service did the death rate of these troops fall below that of the white commands.

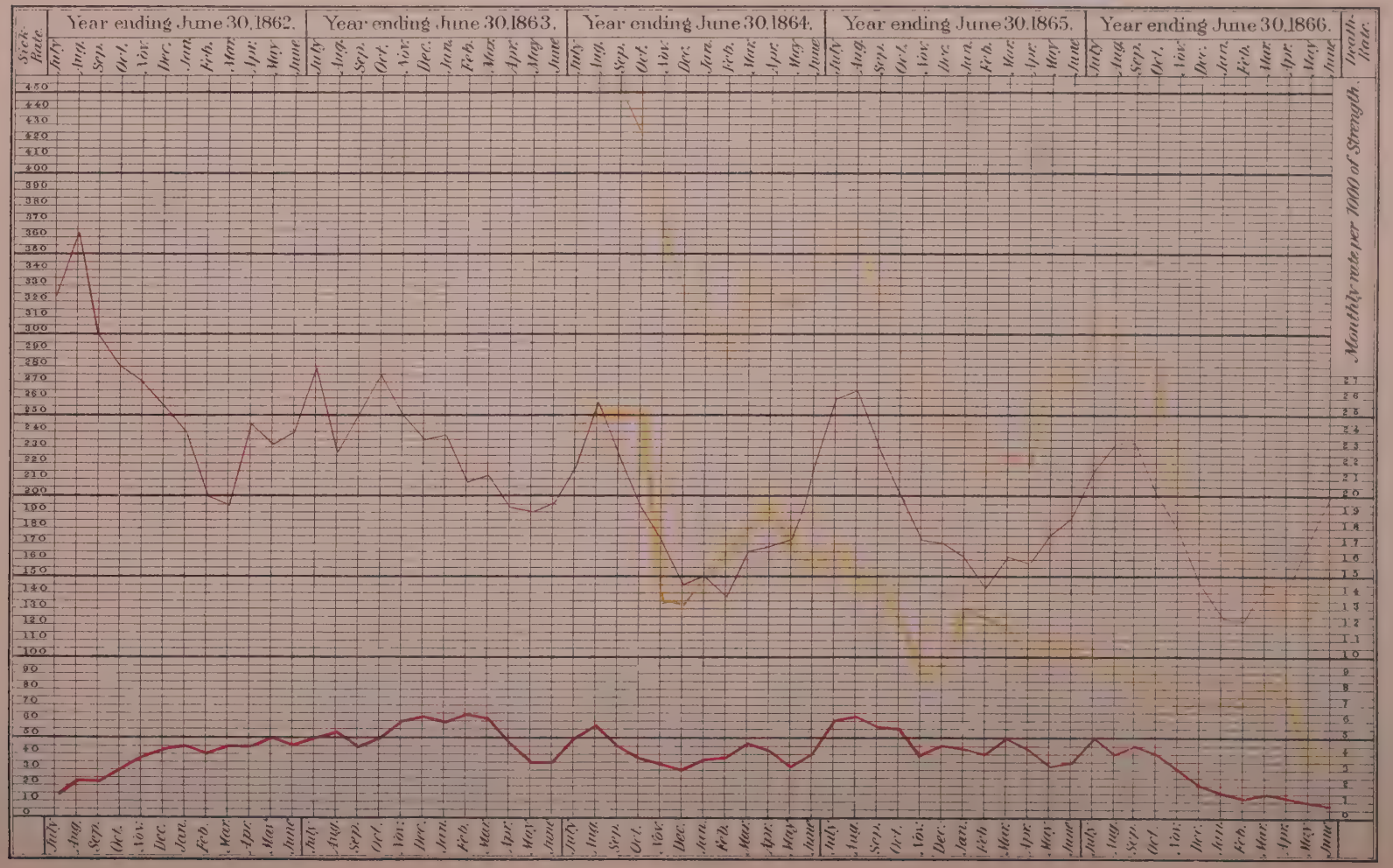
Discharges on account of disability from disease.—The sick and mortality rates by no means express the whole of the loss to the army occasioned by disease. Large numbers of men were discharged as unfit for military service on account of disease that in a majority of instances originated in the line of duty.

The records of the Adjutant General's Office are understood to embrace certificates of disability on which 275,738 white soldiers of the regular and volunteer army were discharged, but the Surgeon General's Office has reports of only 215,312 such cases. Of these, 48,374 were based on wounds, accidents and injuries; 4,439 on deformities, immaturity and senility, disabilities which existed prior to enlistment; and 25,915 on causes that were not specified. Dropping these, there remain 136,584 certificates in which the disease is stated. But if the cases in which the disease was not stated and those reported to the Adjutant General, but not to the Surgeon General of the Army, were distributed *pro rata* among the discharges occasioned by wounds, by conditions which should have prevented enlistment, and by disease, the number referred to the last cause would be increased to 198,849, equal to an annual loss of 82.2 men in every thousand of strength.

The files of the Adjutant General's Office include certificates pertaining to 9,807 colored men, while those in the Surgeon General's Office number only 8,223; and of these

Diagram showing the Prevalence of Disease and the Mortality caused thereby among the White and the Colored Troops of the United States Armies during the years of the War and the year following the War, expressed in monthly rates per thousand of strength present.

Sickness; White Troops. *Mortality; White Troops.* *Sickness; Colored Troops.* *Mortality; Colored Troops.*


Sick-Rate.
Year ending June 30, 1862.
Year ending June 30, 1863.
Year ending June 30, 1864.
Year ending June 30, 1865.
Year ending June 30, 1866.
Death-Rate.
Monthly rate per 1000 of Strength.
July Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June

1,479 are based on wounds, 687 on causes which should have rejected the recruit, and 1,226 on unspecified causes. Dropping these, there remain 4,831 certificates in which the disease is specified. But if these figures were treated as in the case of the white troops, the number of discharges due to disease would be augmented to 6,771, equal to an annual loss of 35.3 men in every thousand of strength.

These heavy losses were not wholly due to the diseases incident to military service. Many of the disabilities existed prior to enlistment; for instance, not all of the men discharged for consumption contracted the disease in the service, nor did all of those discharged for hernia become ruptured in the performance of military duty. Ignorance, carelessness and intentional fraud at the recruiting depôts were at first responsible for the enrollment of this worse than valueless material; afterwards liberal bounties induced men to conceal infirmities in order to secure acceptance. In garrison or winter quarters their disabilities were in many instances not manifested; but when exposed to the hardships of a campaign they swelled the sick list, crowded the hospitals, and were eventually discharged. Dr. TRIPLER reported that of 3,939 discharges for disability from the Army of the Potomac during the last quarter of the year 1861, 2,881 were for disabilities that existed at the time the men were enlisted.* Medical officers serving in the field had their duties materially increased by the presence of cases of this character. Some adverted to the fact apparently to explain the large number of discharges reported from their commands; others entered a vigorous protest against the gross negligence of the recruiting authorities. A few extracts are herewith submitted, and as these are by no means exceptional cases, it will be appreciated that a considerable percentage of the disabilities were not fairly attributable to the service of the soldier:

I consider the careful inspection of the volunteers before acceptance a matter of the greatest importance. The great number of discharges for disqualifying defects among the three-months men that have come under my own notice, convinces me either that the men were not inspected at all, or else that the duty must have been performed by inexperienced officers. The incumbrance and dead weight of the men of this description with our columns has been a serious and constantly accumulating impediment to its motions.—*Surgeon* CHARLES S. TRIPLER, *U. S. Army, Medical Director, Department of Pennsylvania, Charlestown, Va., July* 18, 1861.

The number of men discharged from service within the last month or two is very large, owing chiefly to the fact that a great many were sent here without undergoing a proper physical examination at the time of their enlistment. For example, some thirty or forty cases of hernia have been sent away, and in almost every instance the disability existed previous to enlistment. I observe, also, that a large number of boys may be found among the troops who are physically incapable of enduring the hardships of a soldier's life in the field.—*Surgeon* J. M. CUYLER, *U. S. Army, Medical Director, Fortress Monroe, Va., August* 3, 1861.

In regard to the condition of the companies, they are, with one or two exceptions, composed chiefly of men who hold respectable positions at home as farmers, mechanics, &c., and who possess some degree of pride concerning cleanliness and proper behavior. It is to be regretted, however, that in the haste of preparation and departure, quite a number were enlisted whose physical condition was such that they ought to have been rejected. A large proportion were examined in the country towns by physicians not regularly appointed, and some were not examined at all. This may help to account for the fact that, while the number of sick in the hospital is not very great, the list of those in quarters is larger than it should be.—*Assistant Surgeon* J. FOSTER HAVEN, jr., *U. S. Vols., Camp Foster, Poolesville, Md., September* 30, 1861.

The 28th Pennsylvania Volunteers, numbering ten companies, left Philadelphia July 26, 1861, with orders to proceed to Harper's Ferry. They had never been regularly examined by a surgeon, and a number of diseased men had been enrolled. These have constantly made the sick list larger than it otherwise would have been. Eleven of these men have been discharged, and certificates of disability made out for fifteen others.—*Surgeon* H. EARNEST GOODMAN, *28th Pa. Vols., November* 14, 1861.

I joined the regiment after it was mustered into service and found over one hundred enlisted men that should have been rejected by the Medical Inspector before their enlistment. As a consequence of this I have been compelled to recommend a large number of men for discharge on certificate of disability. There yet remain a few cases that I doubt not before long will be decided unfit for the duties of a soldier.—*Surgeon* WM. R. THRALL, *27th Ohio Vols., December* 31, 1861.

* See page 47, Appendix to the First Part of this work.

The men in some of the batteries were not properly examined when enlisted, and I have found it necessary to recommend some for discharge on account of hernia, tuberculosis, ununited fractures, &c.—*Ass't Surgeon* WILLIAM A. BRADLEY, jr., *U. S. A., Camp Dupont, Va., December* 31, 1861.

GENERAL: An evil too great to pass unnoticed I now bring to your attention.

Yesterday and to-day I examined eighteen recruits just sent on from New Jersey, and all mustered into service before their arrival. I have unconditionally rejected eight. Of the remainder, one, a butcher, might be made useful as such, although, owing to an old injury, he is utterly unfit for the ordinary duties of a soldier. His case is, therefore, under advisement and awaiting your decision.

One half of these recruits were thus unable to stand the test of a physical examination, while among the whole there were but three or four well-formed and able-bodied men.

In this examination nice distinctions regarding corns, flat feet, unsymmetrical form, &c., were not made. Indeed, I approved of one man on account of previous service whose left elbow-joint has not perfect freedom of motion on account of a former fracture.

Most culpable negligence seems to prevail at the recruiting stations. The medical examination at Trenton or elsewhere can scarcely be better than a farce; at least my experience within the past two days seems to authorize such an opinion. The expense to the Government, and the injury to our cause, resulting from such shameful neglect require no formal expression.

I would suggest that the attention of the authorities of your State be invited to this matter, advising that medical examiners be instructed in their business by spending a week in the office of the medical officer of the regular army who inspects recruits in New York City.

I append a list of the causes requiring the rejection of the eight recruits in question:

1. Over age and fistula in ano of long standing. 2. Dislocation of the clavicle. 3. Hernia. 4. Large scrotal hernia. 5. Movement of right shoulder limited by previous dislocation, knock-knees and large variocele on left side. 6. Total blindness of right eye and imperfect vision of left eye. 7. Left shoulder crippled from an old injury. 8. Syphilis and pulmonary trouble; chest badly formed and general configuration imperfect. To these are added the two men disapproved, but retained for the decision of the commanding general: 1. Louis Loeb, the butcher, who is too fat and heavy for a soldier; his feet and legs are œdematous, and he suffers from an old and severe injury of the right side. 2. Samuel Williams, a trained soldier, but with imperfect motion of the left elbow, resulting from a previous fracture.—*Letter dated October* 11, 1861, *from Brigade Surgeon* GEORGE SUCKLEY, *to Brigadier Gen'l* P. KEARNEY, *commanding* 1*st Brigade New Jersey Vols., near Alexandria, Va.*

The table on the opposite page shows many points of interest connected with the diseases which were the chief causes of disability. The first column of each of its divisions gives for the white and the colored troops respectively the total number of discharges for the specified diseases during the periods covered by the statistics, five and one-sixth years in the one case and three years in the other. The second column expresses these facts in ratios per thousand of strength. The third column shows to what extent each disease contributed to the totality of the discharges for specified diseases, while the last column, giving the mean annual ratio of discharges per thousand of strength, enables a comparison to be made between the disabilities of the white and the colored troops and the frequency of the consequent discharges.

The prominent causes of discharge among the white troops were consumption, diarrhœa and dysentery, and debility, which respectively occasioned 149.4, 127.3 and 106.2 of every thousand discharges for disease. Typhoid and malarial fevers are directly credited with but few discharges; but the disability in a large proportion of the 14,500 debilitated and the 2,224 dropsical men was no doubt due to these morbific agencies. Rheumatism and heart disease, which together caused scarcely one death per thousand of strength annually, contributed largely in diminishing the effective force of the army, the former having constituted 86.2 and the latter 77.9 of every thousand discharges on account of disease.

The relations between death and discharge, as the result of disease, may be ascertained by an examination of Tables II and III in connection with that now under consideration. The white troops lost annually by death from disease 53.48, the colored troops 143.4 in every thousand men; but these rates, while correctly expressing the facts of the

TABLE XI.

Discharges for Disability from Disease in the United States Army from May 1, 1861, to June 30, 1866, with ratio per 1,000 of mean strength in Field, Garrison, and General Hospitals, ratio per 1,000 of total discharges and mean annual ratio per 1,000 of strength.

DISEASES.	WHITE TROOPS.				COLORED TROOPS.			
	Number of discharges during the 5½ years.	Ratio per 1,000 of the mean strength in field, garrison and general hospitals.	Ratio per 1,000 of total discharges for specified disease.	Mean annual ratio per 1,000 of strength.	Number of discharges during the 3 years.	Ratio per 1,000 of the mean strength in field, garrison and general hospitals.	Ratio per 1,000 of total discharges for specified disease.	Mean annual ratio per 1,000 of strength.
All diseases	198,849	424.7	.....	82.2	6,771	105.9	.....	35.3
Specified diseases only	136,584	291.7	1,000.0	56.5	4,831	75.6	1,000.0	25.2
Typhoid Fever	909	1.9	6.7	.37	10	.2	2.1	.05
Malarial Fevers	853	1.8	6.2	.35	30	.5	6.2	.16
Diarrhœa and Dysentery	17,389	37.1	127.3	7.19	359	5.6	74.3	1.87
Eruptive Fevers	427	.9	3.1	.18	3	.....	.6	.02
Debility	14,500	31.0	106.2	5.99	540	8.4	111.8	2.82
Syphilis	1,779	3.8	13.0	.74	86	1.3	17.8	.45
Rheumatism	11,779	25.1	86.2	4.87	874	13.7	180.9	4.56
Dropsy	2,224	4.7	16.3	.92	109	1.7	22.6	.57
Consumption	20,403	43.6	149.4	8.43	592	9.3	122.5	3.09
Scrofula	907	1.9	6.6	.37	147	2.3	30.4	.77
Epilepsy	3,872	8.3	28.3	1.60	174	2.7	36.0	.91
Insanity	819	1.7	6.0	.34	34	.5	7.0	.18
Paralysis	2,838	6.1	20.8	1.17	69	1.1	14.3	.36
Ophthalmia	1,463	3.1	10.7	.60	25	.4	5.2	.13
Deafness	1,157	2.5	8.5	.48	38	.6	7.9	.20
Heart disease	10,636	22.7	77.9	4.40	161	2.5	33.3	.84
Varicose Veins	1,969	4.2	14.4	.81	69	1.1	14.3	.36
Varicocele	1,390	3.0	10.2	.57	25	.4	5.2	.13
Asthma	1,220	2.6	8.9	.50	42	.7	8.7	.22
Bronchitis	3,729	8.0	27.3	1.54	96	1.5	19.9	.50
Inflammation of Lungs	1,092	2.3	8.0	.45	25	.4	5.2	.13
Inflammation of Pleura	495	1.1	3.6	.20	18	.3	3.7	.09
Hæmorrhage from Lungs	634	1.3	4.6	.26	4	.1	.8	.02
Hernia	9,002	19.2	65.9	3.72	358	5.6	74.1	1.87
Inflammation of Liver	1,354	2.9	9.9	.56	29	.4	6.0	.15
Piles	1,555	3.3	11.4	.64	43	.7	8.9	.22
Inflammation of Kidneys	1,069	2.3	7.8	.44	27	.4	5.6	.14
Anchylosis	1,838	3.9	13.5	.76	105	1.6	21.7	.55
Diseases of Spine	1,547	3.3	11.3	.64	31	.5	6.4	.16
Ulcers	1,138	2.4	8.3	.47	46	.7	9.5	.24

official records, do not convey with accuracy the relations of death to disease. In view of the number of men discharged for diarrhœa and dysentery it is evident that the mortality rates for these intestinal affections would have been greatly increased had the undoubtedly

serious cases that led to the issue of these certificates been followed up to their termination. In view also of the disproportion between the discharges from the white and the colored commands, the mortality from disease, as above expressed, requires modification. Among the former 82.2, among the latter only 35.3 men were discharged annually from every thousand present. No doubt many of these went home to die. If it be assumed that more deaths occurred among the 82.2 discharged white men than among the 35.3 colored men, the difference between the mortality rates of the two will be lessened. But even if the whole number of cases in each instance died ultimately of the disease which occasioned the disability, the greater mortality among the colored troops would still be evident, for the sum of the deaths and discharges among them numbers 178.7 annually per thousand of strength as against 135.68 among the white troops.

The infrequency of discharge among the colored troops may be attributed chiefly to their peculiar condition at that disturbed period of their history, and to the more rapidly fatal course which disease certainly ran when these men became its subjects. While 7.19 whites were annually discharged on account of diarrhœa and dysentery, 5.99 on account of debility and 8.43 on account of consumption from every thousand men, in the hope that the change of climate, scene and surroundings consequent on a return to their northern homes would tend to prolong existence, the corresponding figures for the colored troops were only 1.87, 2.82 and 3.09. The cases represented by the difference between these figures were retained in hospital until the occurrence of the fatal event, in some instances because of the imminence of that event, in others because of the homeless condition of the colored soldier.

Transfers to the veteran reserve corps.—The list of men discharged for disability would have been considerably larger but for the establishment of the Veteran Reserve Corps. This command absorbed a large number of men who would otherwise have been discharged. From certain tables appended to a report of Surgeon J. H. Baxter, U. S. Volunteers, Chief Medical Officer, Provost Marshal General's Bureau, dated April 28, 1864, it is found that among officers the principal disabling cause was wounds received in battle. Of 636 officers transferred, 426, or two-thirds of the whole number, were the subjects of gunshot wounds which prevented their participation in active or field service. Among the enlisted men, however, disablement by disease was more extensive than by wounds. Of a total of 25,031 transferred in 1863, 6,067, or 242.3 per thousand, were occasioned by gunshot wounds, and 2,037, or 81.4 per thousand, by injuries mainly also, perhaps, caused by gunshot. Deducting these cases from the total it is found that 16,927 were transferred on account of disease. Chronic diarrhœa and general debility were the chief causes of disablement in these cases, the former having occasioned the transfer of 2,292 men, or 135.4 per thousand of the total from disease, and the latter 1,946, or 115.0 per thousand. Consumption, which figured so largely in discharges, was found in only 217 of the transfers, or in 12.8 per thousand of those for disease. But disease of the heart, rheumatism and hernia contributed as largely to the constitution of the Invalid Corps as to the list of discharges. Heart disease occasioned 1,735 transfers, or 102.5 per thousand of the total from disease, rheumatism 1,363, and lumbago 427, a total of 1,790 cases, or 105.7 per thousand, and hernia 1,017, or 60.1 per thousand.

II.—MEDICAL STATISTICS OF THE CONFEDERATE ARMIES.

The sources of the little information we possess concerning the prevalence and fatality of disease in the Confederate armies have already been noted in connection with the subject of diarrhœa and dysentery.* They consist of the monthly returns of sick and wounded of the Army of the Potomac for the nine months from July, 1861, to March, 1862; the reports of certain general hospitals in Virginia for the four months, September to December, 1862; the original registers of the Chimborazo Hospital, Richmond, Va., extending from October 17, 1861, to March 31, 1865, and the figures published by Dr. JOSEPH JONES, of New Orleans, La., as compiled from the records of the Surgeon General of the Confederate States Army.

The Returns of the Army of the Potomac give 151,237 as the number taken sick and wounded during the nine months in an average strength of 49,394 men. The cases of sickness numbered 148,149, equivalent to three entries per man, 3,019 per thousand, during the nine months, or to four entries per man, 4,025 per thousand, for the year. The United States Army of the Potomac during the same nine months had 2,136 cases per thousand of strength, equivalent to an annual rate of 2,848 cases. The deaths on the Confederate returns number 2,016, but they are given only as the total number that occurred among the sick and wounded; their distribution among the specified diseases and wounds is not known.

The hospital reports show 45,544 admissions, of which 34,890 were for specified diseases; but the deaths, 1,899, are not distributed.

The registers of the Chimborazo Hospital, Richmond, Va.,† which have been carefully examined and freed from duplication of cases originating in transfers from ward to ward, show a total of 77,889 admissions; 14,661 of these are recorded under the headings of Class V of the U. S. sick reports, comprising wounds, accidents and injuries. 12,057 have no entry in the column of diagnosis, 50 are reported as malingerers and 771 as convalescents, without specification of the disease or injury. There remain 50,350 cases of specified sickness, but the result in 26,501 of these cases is unknown, as 14,464 were transferred to other hospitals, 5,537 were furloughed, while in 6,500 no disposition is recorded. Of the cases with known results, 23,849 in number, 19,457 were returned to duty, and to these may be added 998 terminated by desertion; 2,717 died and 677 were discharged. The mortality was therefore 11.39 per cent., equivalent to one death in every 8.8 terminated cases. An abstract of the cases in this hospital is given on the following page.

Some interesting data bearing on the mortality of disease in general, and of some specified diseases, may be gathered from the various publications of Dr. JOSEPH JONES.‡

* Page 26, Part Second of this work.

† Reference was made in a foot-note on page 28 of the Second Part of this work to a partial statement of the statistics of this hospital by Dr. JOSEPH JONES (*Richmond and Louisville Med. Jour.*, June, 1870, p. 650), and reasons were assigned for preferring to them the more complete statistics compiled from the hospital registers. Another partial statement of the statistics of this hospital was published by S. E. HABERSHAM—*Obs. on the statistics of Chimborazo Hospital, with remarks upon the treatment of various diseases during the recent civil war.—Nashville Jour. of Med. and Surg.*, N. S., Vol. I, 1866, p. 130—but Dr. HABERSHAM'S table covers only the period from October, 1861, to November, 1863, while the registers include the facts up to March 31, 1865. The former foots up only 36,847 admissions for all diseases, with 2,963 deaths, while the latter give 77,889 cases and 3,944 deaths.

‡ JONES—*Observations on the losses of the Confederate armies from Battle, &c.*—*Richmond and Louisville Med. Jour.*, November, 1869, and March and June, 1870. *Essay on the prevalence of Pneumonia and Typhoid Fever in the Confederate forces*, and on *The diseases of the Federal prisoners confined at Andersonville*, published in the *Medical Volume of the Memoirs of the United States Sanitary Commission*, New York, 1867. *Pneumonia in the Confederate Army*, in Vol. I of his *Medical and Surgical Memoirs*, New Orleans, 1876.

Table XII.

An Abstract of the cases of Specified Diseases, with recorded terminations, and of the Deaths among such cases at the Chimborazo Hospital, Richmond, Va.

Specified Diseases.	Number of cases with known results.	Deaths among the number of cases with known results.	Percentage of fatal cases.	Deaths per 1,000 deaths from the total of specified disease-causes.
Continued Fevers	2,153	885	41.11	325.7
Malarial Fevers	1,988	125	6.29	46.0
Eruptive Fevers	760	166	21.84	61.1
Diarrhœa and Dysentery	4,644	455	9.80	167.5
Debility and Anæmia	5,780	117	2.02	43.1
Consumption	189	52	27.51	19.1
Rheumatism	1,984	80	4.03	29.4
Scurvy	119	8	6.72	2.9
Bronchitis and Catarrh	1,099	89	8.10	32.8
Pneumonia and Pleurisy	1,568	583	37.18	214.6
Other specified diseases	3,565	157	4.40	57.8
Total specified diseases	23,849	2,717	11.39	1,000

He states that the reports of sick and wounded filed in the Office of the Surgeon General of the C. S. A., exclusive of those from the Trans-Mississippi department, gave the following figures up to December 31, 1862:

	On Field Returns.		On Hospital Reports.		Total Deaths.
	Cases.	Deaths.	Cases.	Deaths.	
All diseases and wounds	848,555	16,220	441,689	19,359	35,579
Gunshot wounds	29,569	1,623	47,724	2,618	4,241
All diseases and wounds except gunshot wounds	818,986	14,597	393,965	16,741	31,338

Dr. Jones has, however, pointed out that, on account of the repeated transfers of patients from one hospital to another, the number of cases shown by the hospital reports as admitted for treatment bears no ascertainable relation to the actual number of patients admitted from the field. This will readily be acknowledged, in view of the fact that while a total of only 108,068 cases were sent from the field to general hospitals, no less than 441,689 cases were reported as admitted on the hospital registers.

But since the system of reports in the Confederate army was similar to that employed in our own service, and since the hospital cases in both services were derived from similar sources, consisting of those from the field, those originating in the hospital population, and an indefinite number from men and commands on detached or special duties, the number of cases borne on the field reports of each service may be compared with the corresponding number of deaths in field and hospital, with the view of contrasting the relative mortality from disease in the two armies. In accordance with Dr. Jones' figures, 31,338* deaths in

* These numbers should probably be 31,238 and 819,286; see the totals in Table XIII of the text. Dr. Jones' statistics are full of inaccuracies, the result apparently of careless preparation and proof-reading.

field and hospital corresponded with 818,986 cases of disease and injury other than gunshot wounds. The deaths constituted 3.82 per cent. of the cases, or in other words, were to the cases as 1 : 26. In recasting our statistics* to conform to the classification adopted by Dr. JONES in his statement tabulated above, it is found that from the commencement of the war to December 31, 1862, the total number taken on sick report for all causes except gunshot wounds was 1,709,416 cases, of which 34,326 died, the deaths constituting 2 per cent. of the cases, or being to them in the proportion of 1 : 50.

The following table contrasts the ratios calculated from Dr. JONES' figures with those obtained from the statistics of our army for the same period:

TABLE XIII.

A Comparison of the Prevalence and Fatality of Disease in the Opposing Armies from the Commencement of the War to December 31, 1862.

	CONFEDERATE FORCES.					U. S. FORCES.				
	Total cases.	Total deaths.	Ratio of cases per 1,000 cases of all diseases.	Ratio of deaths per 1,000 deaths from all diseases.	Percentage of mortality.	Total cases.	Total deaths.	Ratio of cases per 1,000 cases of all diseases.	Ratio of deaths per 1,000 deaths from all diseases.	Percentage of mortality.
Continued Fevers	36,746	12,225	45	391	33.27	51,923	11,571	30	337	22.28
Malarial Fevers	115,415	1,333	141	43	1.15	274,053	2,603	160	76	.95
Eruptive Fevers	44,438	2,274	54	73	5.12	38,888	2,050	23	60	5.27
Diarrhœa and Dysentery	226,828	3,354	277	107	1.48	482,764	6,040	283	176	1.25
Pulmonary affections	42,204	7,972	51	255	18.89	196,567	4,607	115	134	2.34
Rheumatism	29,334	.....	36	.....	.....	88,475	122	52	3	.14
All other diseases	324,321	4,080	396	131	1.26	576,746	7,333	337	214	1.32
Total diseases and injuries exclusive only of gunshot wounds.	819,286	31,238	1,000	1,000	3.81	1,709,416	34,326	1,000	1,000	2.01

It is greatly to be regretted that Dr. JONES has not published the mean strength for the period corresponding to his sick reports. He has given, it is true, the mean strength represented by the field reports of the Confederate Army for each month of 1862 and for the first six months of 1863,† but as no mean strength for 1861 is tabulated, and as there is no way of ascertaining what portion of the figures given in his text belongs to that year and what portion to 1862, it is impossible to compute trustworthy ratios of cases to strength for either year.‡ Nevertheless, by making use of the sick report of the Confederate Army

* Published in Tables III, XXIV and XLVII, Part First of this work. † *Richmond and Louisville Medical Journal*, Vol. VIII, 1869, p. 351.

‡ Nor can any assistance be obtained in this connection from an interesting article published originally in the *New York Tribune*, and subsequently reprinted in the *Historical Magazine—Muster rolls of the Confederate Army for 1862, 1863 and 1864. The Historical Magazine and Notes and Queries concerning the Antiquities, History and Biography of America*. Morrisania, New York, Vol. II, N. S., 1867, page 103. Mr. HENRY B. DAWSON, the editor of this magazine, invited the attention of the Surgeon General to the article cited, as likely to prove useful in connection with the data collected by Dr. JONES. Unfortunately the statements in this article referring to the year 1861 are too fragmentary to be used in computing ratios. Indeed they could not be safely so used were they as complete as the figures for 1862, contained in the same article. This will be readily understood on comparing the strengths reported for 1862 with those given by Dr. JONES. Thus, the article in question contains a table purporting to give "approximately and in round numbers the strength and disposition of the different Confederate armies at several important periods during the war." Two of these periods fall within the year 1862. The first, for July 20, 1862, does not include the Trans-Mississippi department, and gives the total strength of the "Armies of East and West" at 289,000 present, of whom 217,000 are reported "for duty." Now the table of Dr. JONES, referred to at the commencement of this note, which also does not include the Trans-Mississippi department, gives the "mean strength, officers and men," for July, 1862, at 79,999. The second period for which the total strength of the "Armies of East and West" are given in the *Historical Magazine* is September, 1862; this includes the Trans-Mississippi department. Deducting the force reported for that department there still remains, according to the magazine article, a force of 228,000 present, of whom 195,000 are reported for duty. But Dr. JONES gives the "mean strength, officers and men," for September, 1862, at 125,408. Nor does this enormous discrepancy indicate any unfaithfulness on the part of either authority. The magazine writer attempted to give a correct notion of the whole Confederate force; Dr. JONES necessarily intended only to give the actual mean strength of that part of the Confederate force represented by the sick reports to which he had access. Ratios computed from the cases and deaths derived from the latter, and the strengths derived from the former source, would understate the sickness and mortality of the Confederate armies to an indefinite extent.

of the Potomac, preserved by Dr. WILLIAMS, and of certain figures published by Dr. JONES,* it is possible to calculate sick rates for a part of the Confederate forces during certain periods prior to July, 1863, the aggregate monthly strength represented being 123,257 men. In Table XIV the information gathered concerning these forces is presented and calculated into ratios per thousand strength, which are placed for comparison in juxtaposition with the rates furnished by the white troops of the United States Army during the year 1863.

TABLE XIV.

Cases of Sickness and Wounds reported from certain of the Confederate Armies during portions of the years 1861, 1862 and 1863, with the strength present during the periods covered by the statistics, and the calculated annual rates per thousand of strength, in juxtaposition with the corresponding rates of the United States Army for the year ending June 30, 1863.

	Army of the Potomac, July, 1861, to March, 1862.	Department of South Carolina, Georgia and Florida, January, 1862, to July, 1863.	Confederate forces at Mobile, Ala., January, 1862, to July, 1863.	Department of Tennessee, June, 1862, to May, 1863.	Army of the Valley of Virginia, January, 1862, to October, 1862.	Aggregate.	ANNUAL RATES PER THOUSAND OF MEAN AGGREGATE STRENGTH.	
Number of months	9	19	19	12	10	.....		
Average monthly strength	49,394	25,732	6,752	40,282	15,582	123,257	Confederate Army.	U. S. Army.
Cases of disease and wounds	151,237	157,113	58,453	226,721	53,198	646,722	4,563	2,861
Gunshot wounds	.....	.....	.....	.....	.....	.....	159(*a*)	93
Cases of disease	.....	.....	.....	.....	.....	.....	4,404	2,768
Continued Fevers	10,197	.....	.....	.....	.....	10,197	275	125(*b*)
Malarial Fevers	16,781	41,526	13,940	36,665	3,876	112,788	796	460
Diarrhœa and Dysentery	36,572	.....	.....	.....	.....	.....	987	543(*b*)
Pneumonia	3,233	2,220	1,161	6,974	1,034	14,622	103	34
Pleurisy	734	445	135	1,158	211	2,683	19	17
Laryngitis	231	373	45	221	101	971	7	10
Phthisis	315	184	191	902	85	1,677	12	9
Tonsillitis	1,312	1,428	408	358	514	4,520	32	30
Acute Bronchitis and Catarrh, including cases reported as epidemic	19,455	18,862	3,500	11,575	5,408	58,800	415	192
Chronic Bronchitis	.....	373	176	855	235	1,639	16	16
Asthma	.....	251	111	290	36	688	7	6
Acute Rheumatism	.....	1,953	1,189	4,732	1,518	9,392	90	76
Chronic Rheumatism	.....	2,047	854	5,195	1,040	9,136	87	76

(*a*) See the text for the derivation of this rate.

(*b*) To effect an allowable comparison between the Union and Confederate figures indicating prevalence, this annual rate is based on the reports of the Union Army of the Potomac for the nine months, July, 1861, to March, 1862, inclusive.

The imperfection of the data here presented is obvious; only in the figures of the Confederate Army of the Potomac are the cases of disease separated from those of wounds received in battle. But as the gunshot casualties in this army during the nine months covered by the records do not fairly represent the frequency of these injuries, the rate derived from them cannot with propriety be applied to the consolidated figures from the

* See pages 571–589 of the *Medical Volume of the U. S. Sanitary Commission Memoirs*, New York, 1867.

other departments. Fortunately, Dr. JONES has put on record figures which show the relation of gunshot wounds to cases of disease in the greater part of the Confederate forces during the first year and a half of the war. The total number of cases of wounds and disease reported by him was 848,555, of gunshot wounds 29,569. These figures authorize the statement that the tabulated annual rate of disease and wounds, 4,563 per thousand strength, included about 159 injuries received in battle. The annual rate for disease alone is thus seen to have been 4,404, which may be compared with the corresponding rate of 2,768 among the Union forces. Continued and malarial fevers, diarrhœa and dysentery, bronchitis and pneumonia, were apparently the chief causes of the increased rate among the southern troops. An expression of the mortality rate per thousand of strength cannot be directly obtained from the data presented. But since the sick rate has been found to number 4,404 cases annually per thousand of strength, while the fatality rate was 3.8 per cent., the annual number of deaths per thousand strength must have been 167.3, a rate larger even than the average annual mortality among our colored troops. Exception may be taken to this calculation as the sick and fatality rates used are derived from different sources, but it serves to indicate in a general way the greater relative mortality among the smaller number of combatants on the southern side.

In brief, so far as comparison can be made with the statistics at command, disease was not only more fatal among the Confederate forces, but the number of cases in proportion to the strength present was considerably greater among them than among the United States troops.

III.—PREVALENCE AND MORTALITY OF DISEASE AMONG THE UNION TROOPS IN CONFEDERATE PRISONS.

The fragmentary character of the evidence relating to the diseases of the Federal prisoners in the hands of the Confederates has already been indicated.* The statistics at command are derived from the original registers of the hospitals attached to the Andersonville and Danville prisons and certain tables prepared by Dr. JOSEPH JONES from official records, and published in his article on the diseases of the Andersonville prisoners.† The records of the Adjutant General's Office, U. S. Army, according to a communication from that office dated June 22, 1878, include the cases of 30,564 Federal soldiers who died while prisoners of war.

The Andersonville register, extending from February 24, 1864, to April 17, 1865, inclusive, shows the number of admissions from the stockaded prison to have been 17,575, but as 458 of these are reported as having been cases of wounds and injuries, and 1,430 have no diagnosis entered against their names, the cases of specified diseases number only 15,987. The result in 946 of these cases is not recorded, so that the number of cases of specified disease that may be traced to their termination is reduced to 15,041. Of these 11,086 died, or 73.7 per cent. of the whole number. This enormous mortality is an index

* See page 31, Second Part of this work.

† There are also in the Office of the Adjutant General a list of 142 deaths that occurred among sick and wounded prisoners at Cahawba, Ala., and two hospital registers, one from Hospital No. 13, and the other from a ward of Hospital No. 21, Richmond, Va. But these registers are valueless for statistical purposes, as so many of the patients received were speedily sent elsewhere: and in the case of the register of Hospital No. 21, the disposition of so many of the cases is unrecorded. The register of Hospital No. 13 extends from June 2, 1863, to February 14, 1865, and contains a record of 695 admissions disposed of by transfer in 621 cases, by death in 67, and by desertion, etc., in 7 cases. The register of Hospital 21 extends from November, 1863, to February, 1865. Of 1,358 admissions it is not stated what became of the patients in 508 instances: 230 were transferred, 226 paroled, 173 returned to quarters and 3 detailed: one is said to have escaped and 217 to have died.

of the condition to which the unfortunate men became reduced before they were admitted to this so called hospital. The professional mind is shocked in endeavoring to realize the scenes presented in an establishment the wards of which formed the portals of the grave to three out of every four soldiers who had the misfortune to enter them. Indeed, it appears that large numbers died uncared for in the prison and were removed to hospital simply for record and interment. Sometimes the deaths in the prison outnumbered those in the hospital. The reports for the week ending September 20, 1864, show the occurrence of 336 deaths in the former and 334 in the latter establishment. At this particular time one-half of the fatal cases were already terminated when taken up on the hospital register. The average number of deaths that occurred daily during the occupation of the depot was thirty; but as many as a hundred deaths were recorded in a single day. Certainly the most fatal field of the war was that enclosed within the stockade at Andersonville, Georgia.

Ratios calculated from the hospital register have a melancholy interest as indicating the manner in which these men were cut down in the flower of their manhood. They have no bearing on the fatality of the specified diseases as the number of those sick within the stockade is not known; but the information yielded concerning the relative prevalence of certain grave diseases is as definite as if complete records of the sickness were at command. The accompanying table gives a summary of the facts gathered from the register:

TABLE XV.

Summarizing the Records of the Hospital at Camp Sumter, Andersonville, Georgia.

	Cases admitted into hospital.	Cases with results unrecorded.	Total cases with recorded results.	Died.	Ratio of cases per 1,000 cases admitted with specified diseases.	Ratio of deaths per 1,000 deaths from specified diseases.	Percentage of fatal cases.
All diseases and injuries	17,875	1,001	16,874	12,541	.....	.....	.....
Wounds and injuries	458	47	411	163	.....	.....	.....
Not specified	1,430	8	1,422	1,292	.....	.....	.....
Specified diseases	15,987	946	15,041	11,086	1,000	1,000	73.7
Continued Fevers	283	2	281	241	17.7	21.7	85.8
Malarial Fevers	254	13	241	163	15.9	14.7	67.6
Eruptive Fevers	164	2	162	82	10.3	7.4	50.6
Diarrhœa and Dysentery	7,352	376	6,976	5,605	459.9	505.6	80.3
Debility	333	36	297	192	20.8	17.3	64.6
Dropsy	498	19	479	383	31.2	34.5	80.0
Consumption	35	.....	35	26	2.2	2.3	74.3
Rheumatism	202	30	172	83	12.6	7.5	48.2
Scurvy	5,662	377	5,285	3,614	354.2	326.0	68.4
Bronchitis	205	4	201	141	12.8	12.7	70.1
Pneumonia and Pleurisy	553	64	489	322	34.6	29.0	65.8
Other diseases	446	23	423	234	27.9	21.0	55.3
Total specified diseases	15,987	946	15,041	11,086	1,000	1,000	73.7

Diarrhœa and dysentery caused somewhat less than one-half, and scurvy somewhat more than one-third of the total number of cases. Under these two headings were entered

814.1 of every thousand cases, leaving only 185.9 cases in the thousand for distribution among all other diseases. These cases also occasioned the greater part of the mortality. Diarrhœa and dysentery caused 505.6 and scurvy 326.0 deaths in every thousand deaths from all diseases, leaving only 168.4 in the thousand for distribution among other fatal diseases.

Dr. JONES has fortunately preserved a monthly return of the cases and deaths in the stockade and hospital for the six months from March 1 to August 31, 1864, giving also the mean monthly strength during the period.* From this paper annual rates of sickness and mortality per thousand of strength may be calculated. Some idea of the relative prevalence of specified diseases and of the mortality caused by them may likewise be obtained from the information thus preserved. In the following table the facts gathered from the paper in question are so arranged as to admit of comparison with the analogous facts from the records of our troops in the field, the Confederate forces and other bodies of men already submitted in Tables II, III, IV, XIII and XIV.

TABLE XVI.

Giving a general view of the Sick and Death Rates from prominent diseases and classes of diseases among the Federal prisoners at Andersonville for the period extending from March 1 to August 31, 1864. Average present 19,453 prisoners.

	Total cases recorded.	Total deaths recorded.	Annual rates of cases per 1,000 strength.	Annual rates of deaths per 1,000 strength.	Cases of specified diseases per 1,000 of all diseases.	Deaths from specified diseases per 1,000 deaths from all diseases.	Percentage of fatal cases.
All diseases and injuries	42,686	7,712	4,388.6	792.8			
Wounds and injuries	386	21	39.4	2.1			
Not specified	474	365	48.8	38.0			
Specified diseases	41,974	7,136	4,315.4	732.6	1,000	1,000	17.2
Continued Fevers	733	199	77.4	20.5	17.9	27.9	26.4
Malarial Fevers	2,966	119	305.0	12.2	70.7	16.7	4.0
Eruptive Fevers	240	80	24.2	8.2	5.6	11.2	33.9
Diarrhœa and Dysentery	16,772	4,529	1,724.4	465.6	399.6	635.6	27.0
Debility	1,[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dropsy	1,556	319	160.0	32.8	37.1	44.8	20.5
Consumption	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Rheumatism	895	20	92.0	2.0	21.6	2.8	2.3
Scurvy	2,501	999	976.2	102.8	236.4	140.2	10.5
Bronchitis	2,808	90	288.6	9.2	66.9	12.6	3.2
Pneumonia and Pleurisy	979	266	100.6	27.4	23.3	37.3	27.2
Other diseases	4,462	302	459.4	31.0	106.4	42.4	6.8
Total specified diseases	41,974	7,136	4,315.4	732.6	1,000	1,000	17.2

The annual sick rate per thousand of prisoners was 4,388.6, or nearly double that of our white troops. Nevertheless, it was not so high as the rate which, according to Table

Memoirs of United States Sanitary Commission, p. [illegible]. Dr. JONES [illegible] the strength for each of these months and gives the average strength as [illegible]. [illegible] numbers in another part of his article, p. [illegible]

XIV, prevailed in certain portions of the Confederate forces. This demonstrates merely that the methods adopted in reporting sick men in the Confederate ranks was not observed in the case of the Andersonville prisoners. The number of sick was certainly vastly in excess of the number of recorded cases. When Dr. JONES inspected the stockade in September, 1864, he found two thousand sick exclusive of those admitted into the prison hospital, and as there was but one medical officer to attend to this enormous number of patients,* and to the cases brought daily to his notice among the mass of the prisoners, the impossibility of preserving an accurate record of the cases is manifest. Large numbers of the prisoners who had never been entered on the sick list were suffering from severe and incurable diarrhœa, dysentery and scurvy. Slighter ailments, such as dictated the relief of a soldier on active service from military duty and his entry on sick report, were of necessity unnoticed. Hence the annual ratio of sick per thousand persons present, and the ratio of deaths to cases, as represented in the table, are certainly far from accurate, and are not admissible for comparison with the records of the Confederate troops on active service. Nevertheless Dr. JONES instituted the comparison and concluded that the diseases referable to exposure without proper clothing and shelter were as prevalent among the Confederate troops as among the Federal prisoners. The following by Dr. J. C. BATES, who was on duty at the prison hospital from April 22, 1864, to March 26, 1865, is of interest in this connection:

"I regret to say that the supply of wood was not sufficient to keep the prisoners from what we term freezing to death. They would not, perhaps, actually freeze to death, but a patient whose blood is thin, and his system worn down, is very susceptible to the influence of cold. In the absence of sufficient food, sufficient stimulus, and especially in the absence of fuel, many of the patients (I speak now of what I saw in my own ward) would, during the night, become so chilled that in the morning, passing round, I would remark to my steward, 'Last night did the work for that poor fellow—he will die;' or 'This one will die; I cannot resuscitate him with the means in my hands, his system is so reduced.' Lying upon the ground during those chilly nights (the weather was not freezing, but sufficient to thoroughly chill the whole system), the patient would reach a condition in which resuscitation was a matter of impossibility after he commenced going down hill from this exposure. I have seen a number die in that way."—*Report on the Treatment of Prisoners of War by the Rebel Authorities, 2d Sess., 40th Cong.*, p. 118.

The figures expressing the relations of individual diseases to the total cases of specified diseases are modified by the exclusion of the many cases of slight ailments which were unnoted, and by the errors in diagnosis consequent on the disposition of so many cases by one medical officer. On September 18, 1864, 906 new cases were reported as taken on sick report; but as none were so reported on the two following days, it may be assumed that these three days were spent in the transfer of the men in question to the sick report. Ten hours daily of uninterrupted labor on the part of the medical officer would have afforded about two minutes for the diagnosis and treatment of each case; but this officer was not at liberty to allow so much time to the new cases, for the 1,102 cases carried forward from the previous day claimed some share of his attention. Naturally, under such conditions, the diagnosis and management of a majority of the cases devolved upon the intelligence of the probably unskilled men who, having given their parole, were granted the freedom of the post and filled subordinate offices in its domestic economy.

Overlooking the influence of inaccurate diagnosis, the annual death rate tabulated may be accepted as a close approximation to the actual mortality. In this consists the chief value of the extracts made by Dr. JONES from the records. During the six months 7,712 deaths occurred in the average strength of 19,453 prisoners present, equaling an

*"At this time only one medical officer was in attendance, whereas at least twenty medical officers should have been employed."—JONES, *op. cit.*, p. 312.

annual rate of 792.8 per thousand, or the extinction of the whole 19,453 in about fifteen months. By comparing those columns of Tables XV and XVI which give expression to the total number of deaths, it will be found that the mortality was much greater during the first six months than during the last eight months, 7,712 deaths having been recorded during the former period, which number was increased to but 12,541 by the addition of those that occurred later. This might indicate that disease became less prevalent or less fatal as time progressed, or that the number of men in confinement became considerably reduced. In the absence of a knowledge of the strength present this point cannot be settled; but it is of interest to observe that while the greater number of the specified diseases participated in this diminished mortality there was one very marked exception. Thus: deaths from continued fevers, numbering 199 in the first six months, became increased to 241 during the whole period, an addition of only 42 fatal cases for the last eight months. Malarial fevers, numbering 119, became correspondingly increased by 44. Only 2 deaths from the eruptive fevers occurred in the last eight months, as against 80 in the earlier period. Diarrhœa and dysentery ended fatally in 4,529 cases during the first six months, and in 5,605 cases during the whole period, an addition of only 1,076 deaths for the last eight months. And so of most of the diseases specified. But scurvy, which occasioned 999 deaths in the first period, had by the end of the second period increased the number of its victims to 3,614 by an addition of 2,613 cases.

The aggravation of the scorbutic element, as time progressed, is manifested by these figures. Of the 7,712 deaths that took place in the first period, diarrhœa and dysentery caused 4,529, or 636 of every thousand, and scurvy 999, or 140 of every thousand. Of the 4,829 deaths that occurred during the second period, diarrhœa and dysentery caused 1,076, or 223 in every thousand, while scurvy caused 2,613, or 541 in every thousand. At first more than one-half of the victims fell before the causes of diarrhœa and dysentery, but later scurvy assumed the role of chief executioner. Together they occasioned more than three-fourths of the total mortality.

Dr. JONES says: The effect of scurvy was manifest on every hand, and in all its various stages, from the muddy pale complexion, pale gums, feeble, languid, muscular motions, lowness of spirits, and fetid breath, to the dusky, dirty, leaden complexion, swollen features, spongy, purple, livid, fungoid, bleeding gums, loose teeth, œdematous limbs, covered with livid vibices and petechiæ, spasmodically flexed, painful and hardened extremities, spontaneous hæmorrhages from mucous canals, and large, ill-conditioned, spreading ulcers covered with a dark purplish fungous growth.

In some of the cases of scurvy the parotid glands were greatly swollen, and in some instances to such an extent as to preclude entirely the power of articulation. In several cases of dropsy of the abdomen and lower extremities supervening upon scurvy, the patients affirmed that previous to the appearance of the dropsy they had suffered with profuse and obstinate diarrhœa; and that when this was checked by a change of diet from Indian-corn bread, cooked with the husk, to rice, the dropsy appeared. The severe pains and livid patches were frequently associated with swellings in various parts, and especially in the lower extremities, accompanied with stiffness and contractions of the knee-joints and ankles, and often with a brawny feel of the parts, as if lymph had been effused between the integuments and aponeurosis, preventing the motion of the skin over the swollen parts. * * *

The scorbutic ulcers presented a dark, purple, fungoid, elevated surface, with livid, swollen edges, and exuded a thin, fetid, sanious fluid instead of pus. Many ulcers which originated from the scorbutic condition of the system appeared to become truly gangrenous, assuming all the characteristics of hospital gangrene.

From the crowded condition, filthy habits, bad diet, dejected and depressed condition of the prisoners, their systems had become so disordered that the smallest abrasion of the skin, from the rubbing of a shoe, or from the effects of the hot sun, or from the prick of a splinter, or from scratching a mosquito's bite, in some cases took on a rapid and frightful ulceration and gangrene.

Dr. JONES was surprised at the comparative absence of typhoid and typhus fevers, notwithstanding the prevalence of the conditions that are supposed to produce them, and attributes this to the immunity derived from a previous attack, or to an insusceptibility

resulting from continued exposure. According to the records continued fevers constituted only 17.9 of every thousand cases. They were thus comparatively rare, but this arose from the increased prevalence of diarrhœal and scorbutic cases rather than from the actual infrequency of typhoid. An annual rate of 77.4 cases of the continued fevers per thousand of strength was recorded; and, as has been already shown, the figures representing the prevalence of disease within the stockade greatly understate the facts. This rate is considerably higher than the average annual rate among our white or colored troops; although, as might be expected, it falls below that shown on Table XIV, as prevailing in the camps of the Federal and Confederate Armies of the Potomac when typhoid was epidemic in many of the new regiments. Continued fevers caused 26.4 deaths annually in every thousand prisoners, as compared with 11.6 deaths among our white troops.

Malarial fevers were infrequent among the prisoners; but as their percentage of fatal cases was much larger than among the United States or Confederate troops, 4 per cent. as against 1.15 and .95 respectively,* it is probable that numbers of intermittent and remittent attacks were not recorded.†

The other diseases specified were presumably of more common occurrence among the prisoners than among our troops in active service; certainly they were more fatal.

Bronchitis, which in the field gave an annual death rate of .49 per thousand of strength, caused a rate of 9.2 among the prisoners, while the corresponding rates for inflammation of the lungs and pleura were 6.3 and 27.4.

This extensive prevalence and terrible fatality of disease among the Andersonville prisoners creates no surprise when the unsanitary conditions affecting them are taken into consideration. These were officially investigated by Dr. JONES, and are fully developed in the report of the Committee of the House of Representatives on the treatment of prisoners of war by the rebel authorities during the War of the Rebellion.‡

The Andersonville stockade and prison hospital were established on a naturally healthy site in the highlands of Sumter County, Ga. The former enclosed twenty-seven acres, consisting of the northern and southern exposures of two rising grounds, between which lay some swampy bottom and a stream running from west to east. In August, 1864, nearly 33,000 prisoners were crowded together on this area, which afforded but little more than 35 square feet for each. But even this limited space was not wholly available, as six acres of the bottom land had by this time become unfit for occupation. Each prisoner had therefore scarcely 28 square feet of surface on which to conduct all the operations of nature. The Confederate guard occupied the fortified exterior of the stockade.

No shelter from the sun, wind or rain, the dews of night or the frosts of winter, was furnished by the Confederate government. Fresh arrivals of prisoners were driven into the stockade and left to find so many feet of foul surface for their occupancy among the army of ragged, vermin-covered, emaciated and dying men already there. The pines and other small trees that had originally sparsely covered the enclosure had been cut down. Fragments of tent-canvas, blankets, oil-cloth and clothing were stretched upon sticks as a protection from the hot sun. Some of the men burrowed in the ground and others built huts of the mud removed from these burrows.

The sinks were built over the lower portion of the stream, but the volume and flow of the water was insufficient to carry off the excreta. Heavy rainfalls causing the stream to

* See Table XIII *supra* p. 31. † See *infra*, note *, page 109.

‡ *Report No.* 45, *House of Representatives*, 3d *Sess.*; 40th *Congress*, Government Printing Office. Washington, D. C., 1869.

overflow spread the foul accumulations over the adjoining bottom lands, converting them into a quagmire of fermenting filth the stench from which has been represented as horrible, sickening and indescribable. Speaking of the stream as it issued from the stockade, JONES says:

As these waters, loaded with filth and human excrement, flow sluggishly through the swamp below, filled with trees and reeds coated with a filthy deposit, they emit an intolerable and most sickening stench. Standing as I did over these waters in the middle of a hot day in September, as they rolled sluggishly forth from the stockade, after having received the filth and excrement of twenty thousand men, the stench was disgusting and overpowering; and if it was surpassed in unpleasantness by anything, it was only in the disgusting appearance of the filthy, almost stagnant, waters moving slowly between the stumps and roots and fallen trunks of trees and thick branches of reeds, with innumerable long-tailed, large white maggots, swollen peas, and fermenting excrement, and fragments of bread and meat.

But the pollution of the soil was not confined to the bottom-lands. Many of the men were so prostrated by diarrhœa and scurvy that they were unable to reach the low-grounds on every call of nature, and the general surface of the enclosure became covered with their morbid dejections. The ground was honey-combed with small pits a foot or two in depth, which were used as latrines and emitted an intolerable stench. Later, the tattered clothes of these men became the receptacle for their involuntary discharges; and ultimately the foul and wasted forms were carried out for burial. In the vicious atmosphere of this prison pen myriads of flies and mosquitoes were developed, which would have made life a misery even to healthy men.

There is one form of disease which is almost too horrible to be witnessed, yet we cannot understand the wretchedness of the prison without looking upon it. This is not a solitary case, but we shall find numerous ones before we leave this living charnel-house. We instinctively pause as we reach the awful sight before us, holding our breath lest we inhale the terrible stench that arises from it. Here is a living being who has become so exhausted from exposure that he is unable to rise from the ground, suffering from diarrhœa in its last form. He is covered with his own fæces: the vermin crawl and riot upon his flesh, tumbling undisturbed into his eyes and ears and open mouth: the worms are feeding beneath his skin, burying themselves where his limbs, swollen with scurvy, have burst open in running sores: they have even found their way into his intestines and form a living, writhing mass within him. His case has been represented to the surgeons, but they have pronounced him incurable, and he is left here in his misery, in which he will linger for three or four days more.*

But all the sick in the stockade were not left thus to die when their strength had failed them. The 1,292 fatal cases in which no diagnosis was made may be supposed to represent those exceptional cases in which the medical officers on duty became first aware of the sickness by a knowledge of the death. It will be observed that such exceptions constituted one-tenth of the total mortality.†

In fact, an effort was made to aggregate the sick of the stockade, nearly 2,000 in number at the period of JONES' visit, in four long sheds open on all sides and situated at the north end of the enclosure. Here the haggard, helpless, hopeless miserables lay side by side on the boards or upon such ragged and vermin-covered blankets as they possessed, without bedding—without even straw—while foul emanations and swarms of flies constituted their atmosphere.

The Confederate Congress in May, 1861, passed a bill providing that the rations furnished to prisoners of war should be the same in quantity and quality as those issued to the enlisted men in the Army of the Confederacy. The daily ration per man officially consisted of one pound of beef or three-quarters of a pound of bacon, and one and one-

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* *Op. cit.*, last note, page 40.

† It appears that Andersonville, Ga., was not the only prison in which the sick were left to die in quarters without the care or knowledge of the surgeon. A letter to this office from the Adjutant General's Office, dated June 22, 1878, states that for the month of December, 1864, alone, the Confederate "burial report" at Salisbury, N. C., shows that out of 1,115 deaths, 223 or 20 per cent. died in prison quarters and were not accounted for in the report of the surgeon.

quarter pounds of corn-meal, with an occasional issue of beans, rice, molasses and vinegar. Although this may have been the issue at first, there is no doubt that it was diminished at a later period. ISAIAH H. WHITE, chief surgeon of the prison, in a report dated August 6, 1864, speaks thus of the diet of the prisoners:

> The ration consists of one-third pound of bacon and one and a quarter pounds of meal. The meal is unbolted, and when baked the bread is coarse and irritating, producing diseases of the organs of the digestive system [diarrhœa and dysentery]. The absence of vegetable diet has produced scurvy to an alarming extent, especially among the old prisoners.

It is also well established that this miserable diet was generally not only of an inferior but of a dangerous quality. The beef was often tainted, the bacon decomposing, and the meal musty, innutritious and irritant, the cob having been ground up with the grains. Moreover, the ration was frequently issued to the prisoners imperfectly cooked. Nearly three months after the establishment of the prison the surgeon in charge reported to the commanding officer that—

> The bakery and other culinary arrangements have just been completed, up to which time there had been an inadequate supply of cooking utensils, and in consequence thereof the articles of diet have been insufficiently cooked.

Frequently the food was issued in the raw state. Those of the prisoners who had the strength and energy to cook their allowance, lacked the necessary fuel and kitchen utensils, while many were incapable of the effort had all the facilities been afforded. The issue had, therefore, to be devoured in this condition, if the pangs of hunger were acute and the individual had not as yet reached the stage of apathy that preceded death. Many also were incapable of eating the ration even if properly cooked, on account of the condition of their teeth and gums. Lieutenant-Colonel D. T. CHANDLER, Assistant Adjutant and Inspector General, in his report of an inspection of the prison on August 5, 1864, says of the rations and their preparation:

> The sanitary condition of the prisoners is as wretched as can be, the principal cause of mortality being scurvy and chronic diarrhœa, the percentage of the former being disproportionately large among those brought from Belle Isle. Nothing seems to have been done, and but little if any effort made, to arrest it by procuring proper food. The ration is ½ pound of bacon and 1¼ pounds of unbolted corn-meal, with beef at rare intervals, and occasionally rice. When to be obtained—very seldom—a small quantity of molasses is substituted for the meat ration. A little weak vinegar, unfit for use, has sometimes been issued. The arrangements for cooking and baking have been wholly inadequate, and though additions are now being completed, it will still be impossible to cook for the whole number of prisoners. Raw rations have to be issued to a very large proportion, who are entirely unprovided with proper utensils, and furnished so limited a supply of fuel they are compelled to dig with their hands in the filthy marsh before mentioned for roots, &c.

But as this monotonous diet, inferior in quality, insufficient in quantity, and having its intrinsic harmful properties aggravated by the absence of facilities for its proper preparation was undoubtedly the cause of the diarrhœa, scurvy and starvation, which killed three-fourths of the prisoners who were buried at Andersonville, and contributed largely to the fatal event in the remainder of the cases, all details concerning it have a high etiological value. The following is therefore submitted from the Report of the Committee of the House of Representatives, already cited:

> The rations consisted of corn-meal, bacon, fresh beef, peas, rice, salt and sorghum molasses. The corn-meal was unbolted, some of it ground with the cob, and often filled with sand and gravel. Much of it had apparently been put up while warm, and had become sour and musty either during transportation or while in store. The bacon was lean, yellow, very salt and maggoty; it had been brought to us unpacked, and was covered with dirt and cinders; it was so soft with rust that it could easily be pulled in pieces with the fingers. The beef was slaughtered near the prison, to which it was brought and thrown down in a pile in the north cook-house, where it lay until it was issued to the prisoners. Here, in the hot climate, it was soon infested with flies and maggots, and rapidly changed into a greenish color, emitting an offensive odor peculiar to decaying flesh; it was very lean, but the heat

rendered it quite tender before it was served up. The article denominated black peas, or cow-peas, was brought in sacks, apparently just as it had left the threshing ground of the producer, having never been winnowed or cleansed of the fine pods or dirt which naturally mingles with all leguminous plants while growing in the field; besides, they were filled with bugs, and many of them were so eaten as to leave nothing but the thick, tough skin of the pea in its natural shape. The rice was sour or musty, and had apparently been put up in a half-dried state, when it became heated and wholly unfitted for use.

There were two cook-houses used in connection with the prison. The first of these was in process of erection when the detachment to which I belonged entered the pen, and went into operation about the middle of May. It was located on the north side of and near the swamp west of the prison, and was subsequently enclosed by the defensive stockades. At the time it was built it was supposed to be of sufficient capacity to perform all the cooking necessary for the prisoners, and contained three large brick ovens, and several kettles set in brick-work, for boiling the meat and peas or rice; but it being found impossible to cook [illegible] was constructed some time in the latter part of August. It was located about a hundred yards north of the defences, on a line with the west wall of the prison. [illegible] and contained perhaps a dozen large potash kettles set in brick-work. The old cook-house was thereafter used for baking the corn-meal. A strong force of paroled prisoners was appointed to perform the work in these cook-houses, but with constant labor was unable to supply our wants, and about one-half of the rations were issued raw.

The meal was prepared for baking by first pouring it in quantity into a large trough made for the purpose. A little salt was then added. When [illegible] stirred with sticks to mix it thoroughly. The dough was baked in sheet-iron pans twenty-four by sixteen inches in surface and two and one-half inches deep. The whole was divided into pones containing about a pound, and each of these pones constituted a day's [illegible] mixing this "stuff;" the meal, as above stated, was partly corn and partly cob, and often contained materials that were neither of these; the water was dipped in quantity from the creek, and no means of cleansing it were furnished; and these, with the haste necessary to be made in preparing the dough, conspired to make the mixture unpalatable and sickening, particularly when cold. The prisoners who had charge of the cook-house undoubtedly tried to prepare the food as well as they could, but all of their efforts were in vain with such limited facilities as they had.

The peas and rice were boiled in the north cook-house; [illegible] to the prison, without cleansing or separating from the [illegible] water in which the meat had been boiled; the cooks here, as in the south cook-house, had no means of cleansing the raw material, and had they possessed the facilities [illegible] with the aid of the best machines; but for [illegible] Of these cooked rations there were [illegible] week a pint of peas or rice were issued in addition [illegible] Sometimes a sort of mush was made to take the place of the peas, but although it was a change from the monotonous corn-bread, it was so unpalatable that the bread was preferred. About half of the rations were issued raw; [illegible] one-half of the prisoners receiving raw food ate it as [illegible] issued during the early part of the season; but as the hot weather advanced and the meager [illegible] the daily allowance diminished until it became but a mere morsel to each man.

Some time in the afternoon the ration-wagon drove into the stockade laden with corn-meal, bacon and salt, which were thrown down into a heap in an open space [illegible] ness the haggard crowd gathered about the [illegible] the squad sergeants; gazing, meanwhile, with wolfish eyes upon the little heap as it diminished, or following their sergeant-commissary back to his quarters, in [illegible] carries their food to the accustomed trough. The rations were distributed by the division-sergeant to the mess-sergeant, who then divided them among the men. To avoid quarrelling during the last distribution, it was the custom among all the messes for the mess-sergeant to separate [illegible] men in the mess; one man of the mess was placed a short distance off, with his back towards the parcels, in such a position that he could not see them; the mess-sergeant then pointed to one, with the words, "Who has this?" to which the [illegible] announcing the name of the recipient, when it was given to him. In this manner the whole number was gone through with, with satisfaction to all.

Iron bake-pans, like those used by the [illegible] at this place, in which to bake their own meal and fry their bacon; but nothing of the kind was ever given out afterwards, to my knowledge. The United States soldiers, as is well known, were never provided with other cooking utensils than mess-kettles and mess-pans, both too large to be transported in any other way than upon army wagons. At the time of our capture, in numerous instances, the tin cups and plates which we had were taken from us; our knives, it will be remembered, were confiscated at Danville; nothing, therefore, was left in our possession with which to cook our raw food after it was given to [illegible] We made shift, however, with chips, half canteens, tin cups that had escaped confiscation, and pieces of sheet-iron, to bake one side of the stuff, while the other was scarcely warmed through. The solder of the tin, melting and mingling with the bread, [illegible] rations were at last devoured in a half-cooked state—a fact which aided in the increase of the frightful misery that subsequently occurred, quite as much [illegible]

The prison hospital covered about five acres of ground. It was established in a grove of forest trees which afforded a grateful shade to the unhappy and suffering men. Its atmosphere was polluted by the foul effluvia from the stockade; but irrespective of this, its own emanations rendered it as unfit for occupation as was the general pen. The men were crowded together in old and ragged tents; neither beds nor straw were furnished, and the patients lay in bunks or on the ground, often without even a blanket over them. Sick men, unable to visit the latrines, made use of small wooden boxes in the lanes behind the tents.

Millions of flies swarmed over everything and covered the faces of the sleeping patients, and crawled down their open mouths, and deposited their maggots in the gangrenous wounds of the living and in the mouths of the dead. Myriads of mosquitoes also infested the tents, and many of the patients were so stung by these pestiferous insects that they appeared as if they were suffering from a slight attack of measles. * * * * *

The cooking arrangements were of the most miserable and defective character. Two large iron pots similar to those used for boiling sugar-cane were the only cooking utensils furnished by the hospital for the cooking of near two thousand men; and the patients were dependent in great measure upon their own miserable utensils. They were allowed to cook in the tent-doors and in the lanes, and this was another source of filth and another favorable condition for the generation of flies and other vermin.*

The rations of the hospital appear to have differed from those of the stockade only in having an occasional addition of potatoes. Indeed, it would seem that but for the shelter of the ragged tents, the shade of the trees and the increased area, the hospital patient had little advantage over the prisoner in the stockade. The supply of medicines was generally deficient, often exhausted, and medical comforts were unknown.

At the time of Dr. JONES' visit one medical officer attended to the sick in the stockade while three were on hospital duty. Generally, however, the medical staff consisted of six or eight for the prison and four or five for the hospital. These officers labored faithfully to alleviate the misery and suffering by which they were surrounded, but unfortunately they were powerless to effect a change in the methods of the establishment.

Day after day, for weeks and months, those surgeons labored, breathing the unwholesome air, and in constant contact with those horrible diseases; but they were patient, faithful men, and their sympathy with the victims often benefited them as much as the medicines they prescribed. * * * I gladly record the little acts of kindness performed by them, for they were verdant spots in that vast Sahara of misery. DRS. WATKINS, ROWZIE, THORNBURN, REEVES, WILLIAMS, JAMES, THOMPSON, PILOTT and SANDERS deserve, and will receive, the lasting gratitude of the prisoners who received medical treatment at their hands during that memorable summer at Andersonville.†

The medical profession owes a debt of gratitude to the gentlemen mentioned in the above extract, and to their colleagues on duty in the prison hospital, in that their labors, however fruitless on behalf of the unfortunate men confined at Andersonville, have permitted one unsullied paragraph to appear on that foulest page of American or any other history. The papers published by Dr. JONES, and by the Committee of the House of Representatives, show that Dr. I. H. WHITE, the surgeon in charge of the prison camp, repeatedly called the attention of his superiors to the deplorable condition of the prisoners, appealing for medical and hospital supplies, additional medical officers, an adequate supply of cooking utensils, hospital tents and even for straw for bedding. It is true his requisitions and recommendations should have been put in stronger language; but he probably recognized how utterly fruitless and unprofitable would be appeals to the humanity of an authority whose inhumanity rendered such appeals necessary. The following extract from his report, dated August 6, 1864, to General JNO. H. WINDER, the Commandant of the prison, shows him neither insensible to the suffering around him nor ignorant of the causes that made the prison pen a charnel-house.

* JONES, page 520. † H. M. DAVIDSON, 1st Ohio Light Artillery, page 49 of the report of the Committee already cited.

The evils within the power of the proper authorities to correct:

I. *The crowded condition of the prisoners.*—The number within the stockade should not exceed fifteen thousand. This would allow ample room for the remainder to be camped in order, with streets of sufficient width to allow free circulation of air and enforcement of police regulations. All that portion of the camp on the north side of the stream could then be used for exercise, where roll-call could also be held, thereby materially aiding the commandant of the interior.

II. *Construction of barracks and hospital accommodation.*—There should be no delay in the construction of barracks; with the greatest amount of energy it will be difficult to complete them before the cold weather comes on, when they will be required more than at present. Too great stress cannot be placed on the necessity for the construction of proper accommodations for the sick. There are at present two thousand two hundred and eight in hospital, all poorly provided for, and some three hundred without any shelter whatever. There are also at least one thousand men now in stockade who are helpless, and should be at once removed to hospital. Their removal is prevented by the absence of accommodations. The construction of hospitals should be at once begun, and in the meantime the sick should be at once transferred to some point where they can be properly provided for. An officer should be employed to arrange the stream passing through the stockade. The bottom-land should be covered over with sand, the stream be made deeper and wider, the walls and bottom covered with plank; the same arrangements to continue outside, conducting the drainage freely to the creek beyond, and if necessary, build a dam to prevent the overflow of the banks. The stream from stockade to the railroad should also be improved, and the use of it by the troops outside should be prohibited. Sinks should be at once arranged over the stream of such a nature as to render them inviting; at present, those who have an inclination to use them have to wade through mud and fæces to use them. At the upper part of the stream proper bathing arrangements should be constructed.

III. *Enforcing stringent police regulations.*—Some stringent rules of police should be established, and scavenger wagons should be sent in every day to remove the collections of filth. A large quantity of mouldy bread and other decomposing matter scattered through the camp and beyond the dead-line should be removed at once. If necessary, sentinels should be instructed to fire on any one committing a nuisance in other places than the sinks.

IV. *Establishment of regulations in regard to cleanliness.*—It should be the duty of Confederate sergeants, attending roll-calls, or others, to see that all the men of their command bathe at stated intervals, and that their clothes are washed at least once a week. For this purpose soap should be issued to the prisoners.

V. *Improvement in rations.*—The meal should be bolted and sifted before being used. Arrangements should be speedily made by which rice, beans and other anti-scorbutics should be issued during the present season; green corn might be issued in lieu of bread ration, if not regularly, at least three times a week. If possible, the prisoners should be supplied with vinegar, and with an occasional issue of molasses in lieu of the meat ration, which would tend greatly to correct the scurvy which prevails to a great extent.

The deaths at Camp Sumter, Andersonville, Ga., during the fourteen months of its occupation numbered about 13,000, when the unrecorded cases are taken into consideration. But these figures greatly underrate the mortality consequent on the treatment to which the prisoners were subjected. Thousands of men died after their liberation from this and other southern prisons. There are no records on file showing the subsequent history of the Andersonville captives; but the following communication indicates the probabilities with respect to them, in detailing the condition of those exchanged from Richmond, Va.:

I have the honor to make the following general report of the condition of patients (sick and wounded) who arrived at and were admitted to this hospital from "Belle Island," Va., per flag-of-truce steamer "New York," via City Point, Va., on the 29th instant:

This vessel left City Point with one hundred and eighty-nine sick and wounded. Before she arrived at Fortress Monroe four men died; on the trip from Fortress Monroe to this place four more died—leaving one hundred and eighty-one to be admitted.

Language is inadequate to express fully the condition of this number, and none but those who saw them can have any appreciable idea of their condition. I do not pretend to particularize, for every case presented evidences of ill-treatment: every one wore the visage of hunger, the expression of despair, and exhibited the ravages of some preying disease or the wreck of a once athletic frame.

I only generalize, therefore, when I say their external appearance was wretched in the extreme. Many had neither hats nor shoes, few had a whole garment; many were clothed merely with a tattered blouse or the remnant of a coat, and a poor apology for a shirt. Some had no under-clothing, and, I believe, none had a blanket. Their hair was dishevelled, their beards long and caked with the most loathsome filth, and their bodies and clothing swarmed with vermin.

Their frames were in most instances all that was left of them. A majority had scarcely vitality to enable them to stand. Their dangling, bony, attenuated arms and legs, sharp, pinched features, cadaveric countenances, deep, sepulchral eyes, and voices that could hardly be distinguished (some, indeed, were unable to articulate) presented a picture which could not be looked upon without calling forth the strongest emotions of pity.

Upon those who had no wounds, as well as on the wounded, were large foul ulcers and sores, principally on their shoulders and hips, produced by lying on the hard ground; and those that were wounded had received no attention, their wounds being in a filthy, offensive condition. One man, who died on the trip from Fortress Monroe, told the

surgeon previous to death that his wound had not been dressed since the battle of Gettysburg, Pa., where he was wounded in the head, having both tables of the posterior part of the skull fractured.

Most of the cases were suffering with diarrhœa—some of them with involuntary evacuations—their clothes being the only receptacle for them, and they too weak to remedy the difficulty. This being the case, you can, of course, imagine the stench emitted from them. Many had pneumonia; some in the advanced stages were gasping for breath. Delirious with fever, many knew not their destination or were not conscious of their arrival nearer home; or racked with pain, many cared not whither they went or considered whether life was dear or not; in some life was slowly ebbing, from mere exhaustion and the gradual wasting of the system. How great must be the mortality, then, of these men, and how dreadful among those still suffering the horrors of imprisonment. Every man who could, rejoiced over his escape, deplored the scenes through which he had passed, and mourned the lot of those he had left behind. Weak and debilitated, they wished but to die among their friends, a wish which, unfortunately, will be realized in too many instances.—*Letter of Acting Assistant Surgeon* S. J. RADCLIFFE, U. S. A., *Medical Officer of the day, at the U. S. General Hospital, Division No.* 1, *Annapolis, Md., reporting to the Surgeon in charge the condition of the sick and wounded admitted October* 29, 1863, *from Belle Isle, via City Point, Va.*

The records of the prison hospital at Danville, Va., extending from November 23, 1863, to March 27, 1865, furnish a total of 4,332 cases admitted. As 157 of these were cases of wounds and injuries and 7 cases in which no diagnosis was recorded, the number remaining as due to specified diseases is 4,168. But since there is no record of what became of 429 of these cases, the number of terminated cases of specified disease is reduced to 3,739, of which, 1,074 or 28.7 per cent. were fatal. An examination of the following table will discover the absolute and relative mortality of the prominent diseases for comparison with the Andersonville record, already presented, and with the records of our Northern prisons, to be submitted hereafter.

TABLE XVII.

Summarizing the Records of the Prison Hospital at Danville, Va., Nov. 23, 1863, to March 27, 1865.

	Cases admitted into hospital.	Cases with results unrecorded.	Total cases with recorded results.	Died.	Ratio of cases per 1,000 cases admitted with specified diseases.	Ratio of deaths per 1,000 deaths from specified diseases.	Percentage of fatal cases.
Total cases	4,332	437	3,895	1,084			
Wounds and injuries	157	6	151	10			
Not specified	7	2	5	0			
Specified diseases	4,168	429	3,739	1,074	1,000	1,000	28.7
Continued Fevers	69	12	57	12	16.7	11.1	21.1
Malarial Fevers	235	19	216	17	56.4	15.8	7.9
Eruptive Fevers	880	258	622	165	211.1	153.6	26.5
Diarrhœa and Dysentery	1,418	51	1,367	451(*a*)	340.2	420.0	32.8
Debility	178	18	160	43	42.7	42.1	8.1
Dropsy	62	6	56	24	14.9	22.4	42.9
Consumption	18	1	17	7	4.3	6.5	41.2
Rheumatism	348	17	331	18	83.5	16.8	5.4
Scurvy	91	2	89	6	21.8	5.6	6.7
Scorbutus	269	12	257	31	64.5	28.9	12.1
Pneumonia and Pleurisy	311	19	292	88	74.6	81.9	30.1
Other diseases	280	14	252	242	67.2	225.3	96.0

(*a*) Dr. WOODWARD, on page 35, Part II of this work, gives the number of deaths from diarrhœa and dysentery as 592 instead of 451. The record shows that while in 1,367 terminated cases there occurred 451 deaths, by following out the histories of the cases other than diarrhœa and dysentery 141 of these are found to have proved fatal by the supervention of the prevailing intestinal flux. This accounts, for instance, for the high death-rate attaching to the cases tabulated under the caption of "other diseases."

Diarrhœa and the eruptive fevers, small-pox chiefly, occasioned the largest number of admissions as well as of deaths. Diarrhœas constituted 340.2 of every thousand cases of disease, and caused 420 of every thousand deaths from disease. But scurvy, which exercised so fatal an influence at Andersonville, was less manifest here, as it occasioned only 21.8 of every thousand cases and 5.6 of every thousand deaths. The general percentage of fatal cases of disease in this prison was only 28.7, as compared with 73.7, the Andersonville percentage. Evidently the prisoners at Danville were treated with comparative humanity, although the mortality among the cases was nearly three-fold that reported among the Confederate soldiers treated in the Chimborazo Hospital at Richmond, Va.* The ratios of sickness and deaths to the strength present were no doubt correspondingly augmented among the prisoners, although in the absence of data it is impossible to give any other than this vague expression of the facts.

IV.—PREVALENCE OF DISEASE, AND MORTALITY THEREFROM, AMONG THE CONFEDERATE TROOPS IN UNITED STATES PRISONS.

The rebel soldiers that died in our Northern prisons numbered, according to the monthly reports on file in the Surgeon General's Office, 30,716. Death in 5,569 of these cases was the result of wounds; in 404 the cause was unknown, and in 1,152 unstated. There remain, therefore, 23,591 deaths reported as from specified diseases.

The Confederate prisoners were confined in a number of prison camps, many of which have already been mentioned.† The statistics of nine of these camps have been examined, consolidated and tabulated to indicate the diseases and classes of disease that were the principal causes of the sickness and mortality among the prisoners. The records of these nine camps include 18,808 deaths from specified disease, or about 80 per cent. of the whole number of deaths reported as caused by disease. The statistics of the smaller camps might readily have been added to these, but their addition would have materially increased the size of the tabular statements without adding correspondingly to their value. Everything of interest susceptible of illustration by mere figures relative to the diseases of the prisoners may be gathered from the figures given below. Table XVIII consolidates the data of each prison; Table XIX consolidates the data of the whole, and deduces ratios by which comparisons may be instituted.

On comparing the latter consolidation with Table XIII it will be found that the items making up the total number of cases of disease among the prisoners did not differ much from those constituting the total among the Confederate troops in the field. Thus the two classes of disease, diarrhœa and dysentery and the malarial fevers, which caused the largest number of cases among both these bodies of men, have their prevalence expressed by very similar figures. Among the Confederate forces cases of diarrhœa and dysentery constituted 277 of every thousand cases of disease, while the malarial fevers numbered 141 in the thousand. Among the prisoners the corresponding figures were 268 and 157. The eruptive fevers formed 54 of every thousand among the troops on service, and 68 among the prisoners; pulmonary affections 51 among the former, 58 among the latter; and rheumatism 36 and 34 respectively.

* See Table XII.

† Pages 36–40, Part II, of this work.

TABLE XVIII.*

Showing the number of Cases of certain Specified Diseases and Classes of Disease, and of Deaths attributed to them, among the Confederate Prisoners of War at the principal Prison Depôts, for the period covered by the records of each prison.

	Camp Douglas, Illinois, from February, 1862, to June, 1865.		Alton, Illinois, from September, 1862, to June, 1865.		Rock Island, Illinois, from February, 1864, to June, 1865.		Camp Morton, Indiana, from June, 1863, to June, 1865.		Johnson's Island, Ohio, from June, 1863, to June, 1865.		Camp Chase, Ohio, from February, 1864, to June, 1865.		Elmira, New York, from July, 1864, to June, 1865.		Fort Delaware, Delaware, from August, 1863, to June, 1865.		Point Lookout, Maryland, from September, 1863, to June, 1865.	
Number of months recorded	41		34		17		25		25		17		12		23		22	
Mean strength present	5,361		1,008		6,030		2,865		2,114		3,570		6,591		6,406		9,610	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
All diseases and injuries	70,088	4,009	29,095	1,475	13,678	1,604	9,122	1,187	3,697	161	24,687	1,771	10,455	2,931	44,388	2,218	44,934	3,704
Wounds, injuries and unspecified diseases	1,279	80	329	20	225	15	259	12	126	5	741	32	277	4	817	19	1,399	65
Specified diseases	68,809	3,929	28,766	1,455	13,453	1,589	8,863	1,175	3,571	156	23,946	1,739	10,178	2,927	43,571	2,199	43,535	3,639
Continued Fevers	1,116	351	190	70	52	54	55	42	93	26	115	53	239	140	432	156	267	217
Malarial Fevers	10,151	233	7,206	177	2,384	52	1,954	119	417	10	4,258	34	628	65	4,725	175	6,864	161
Eruptive Fevers	4,671	823	2,632	537	1,797	436	548	85	160	17	1,865	362	1,368	388	2,593	472	1,033	333
Diarrhœa and Dysentery	13,455	698	5,580	229	3,874	363	2,241	315	1,855	46	4,063	226	4,379	1,394	9,659	644	20,474	2,050
Anæmia	585	4	465	27	47	8	68	4	35	1	402	24	202	17	792	38	613	33
Consumption	259	113	47	27	26	761	34	26	14	7	24	12	23	13	32	11	76	46
Rheumatism	3,242	37	518	7	700	1	190	5	106	1	988	0	360	9	1,494	19	772	16
Scurvy	3,745	39	390	6	439	14	778	6	58	0	828	5	356	20	6,351	94	3,312	167
Bronchitis	1,628	27	400	4	391	25	178	1	57	1	240	1	116	19	965	34	513	21
Pneumonia and Pleurisy	4,655	1,296	1,134	276	1,464	397	1,351	495	99	25	1,681	954	1,882	773	1,128	401	925	425
Other diseases	25,332	308	10,204	95	2,279	163	1,466	77	677	22	9,482	68	625	89	15,400	155	8,686	170
Total specified diseases	68,809	3,929	28,766	1,455	13,453	1,589	8,863	1,175	3,571	156	23,946	1,739	10,178	2,927	43,571	2,199	43,535	3,639

The figures representing the mean number of prisoners present at each depot for the periods specified were calculated from the data in the monthly sick reports. They differ somewhat from the strength given in the Monthly Returns of Military and Political prisoners on file in the office of the Adjutant General of the Army, but as the former have already been used in the discussion of diarrhœa and dysentery in the Second Part of this work, it has been deemed advisable to retain them, especially as the differences are inconsiderable and the effect on the ratios insignificant. The mean numbers present, according to the statistics of the Adjutant General's Office, are as follows:—Camp Douglas, Illinois, 5,338; Alton, Illinois, 1,017; Rock Island, Illinois, 5,736; Camp Morton, Indiana, 2,844; Johnson's Island, Ohio, 2,402; Camp Chase, Ohio, 3,734; Elmira, New York, 6,396; Fort Delaware, Delaware, 6,288; and Point Lookout, Maryland, 9,483.

† At Rock Island *post mortem* evidence was always taken as to the cause of death while no corresponding change was made in the diagnosis of the case, bronchitis, pneumonia, etc., as originally entered on the hospital registers; hence the anomaly in the recorded deaths from consumption.

TABLE XIX.

In which the items of Table XVIII are consolidated and expressed in average annual rates per thousand of strength, with the ratio of cases of specified diseases to cases of all diseases, of deaths from specified diseases to deaths from all diseases, and the percentage of fatal cases of specified disease. Average strength present 21,515 men.

Diseases.	Total number of cases.	Total number of deaths.	Annual ratios per thousand of average strength: Cases.	Annual ratios per thousand of average strength: Deaths.	Cases per thousand cases of all diseases.	Deaths per thousand deaths from all diseases.	Percentage of fatal cases.
Continued fevers	2,759	1,195	30.1	13.0	38.5	59.0	43.3
Malarial fevers	20,797	1,137	226.7	12.4	290.1	56.6	2.7
Pyogenic fevers	6,167	1,151	67.2	12.5	86.0	183.6	28.7
Diarrhœa and dysentery	41,780	1,965	455.4	21.4	582.8	97.1	4.7
Anæmia and debility	1,205	59	13.1	0.6	16.8	8.3	4.9
Gangrene	397	157	4.3	1.7	5.5	17.5	61.9
Pneumonia	1,340	47	14.6	0.5	18.7	5.2	1.1
Scurvy	2,257	171	24.6	1.9	31.5	18.7	2.2
Dysentis	1,366	27	14.9	0.3	19.1	7.1	3.0
Intermittent fevers	19,199	3,381	209.3	36.9	267.8	368.1	35.2
Other causes	72,121	1,047	786.1	11.4	1,005.9	61.0	1.5
Total entered forces	169,388	10,309	1,847.4	240.4	2,362.0	1,000	7.7

But although this tendency existed among the cases showing that the diseases prevailing in the prisons were generally those that were at the same time affecting the Confederate soldiers who were not prisoners, the fatality in the cases of the continued fevers was 7.7 per cent. as against 3.8 per cent. in the Confederate ranks. No doubt the relative mortality was considerably greater among the prisoners than among the men on service but the increase shown by the statistics is in the main due to a failure to take up certain cases in the sick report the deaths consequently forming a larger percentage of those that were taken up. The annual number of cases of disease entered on the surgeons' reports per thousand prisoners was 1,767.5; the annual number among the troops in the field per thousand of strength was 2,362. The apparently greater prevalence of disease in the field was obviously due to the entry of men on sick report for slight ailments necessitating temporary exemption from military duty; and the greater fatality of disease as found by the statistics of the prisons, resulted in part from the absence of such cases from the records. Persons with slight ailments did not require the surgeon's signature to excuse them from duty, as in general they had none to perform.

On the assumption that as many trivial cases occurred among the prisoners as among the Confederate ranks—and it can hardly be supposed that there were fewer—the percentage of fatal cases would be 2.2 instead of 7.7. On the assumption that the trivial cases constituted three quarters of the whole the proportion of deaths would be proportionately lessened.

The actual increase in the percentage of mortality was occasioned by the greater prevalence of protracted fevering, low continued fevers and pneumonia as fatal forms. The continued fevers constituted a larger proportion of the mortality among the troops on service than among the prisoners. This is explained by the greater prevalence of these diseases in the Confederate States than in the Federal States, as shown by the Confederate returns of deaths in every thousand cases of fevers.

instead of 10.5 as among the prisoners. Nevertheless, the fatality of the prison cases was greater, 43.3 per cent., than that of those occurring in the ranks, 33.27 per cent.

The terrible prominence of diarrhœa, dysentery and scurvy as causes of sickness and death at Andersonville* is not manifested on the records of our northern prisons. Diarrhœa and dysentery, which occasioned 505.6, and scurvy, which occasioned 326.0 of every thousand deaths at Andersonville, are seen by the above tabulation to have caused in our prisons only 317.1 and 18.7 respectively. The large number of deaths from these diseases among the unfortunate Federal prisoners reduced the proportion caused by other diseases; thus, according to their records, the continued fevers are held responsible for but 21.7 and the malarial fevers for only 14.7 of every thousand deaths, as against 59.0 and 54.6 among the captured Confederates. Not that these and many other diseases were more prevalent or more fatal in the northern prisons; the deaths were merely more generally distributed among the various causes.

But the death rates per thousand of strength afford a more ready means of appreciating the relative mortality among these men. The inmates of the nine prisons tabulated lost annually by disease 230.4 out of every thousand present, as contrasted with 53.48 among our white troops; 143.4 among our colored troops; 167.3† in the rebel armies, and 732.6 among the Andersonville prisoners. The chief causes of these stated mortalities are shown in—

TABLE XX.

Contrasting the Mortality Rates, per thousand of strength, among the White and the Colored Troops of the U. S. Army and the Union and the Confederate Prisoners of War.

Mortality rate per 1,000 strength from—	Northern prisons.	Anderson-ville.	White troops.	Colored troops.
All diseases	230.4	732.6	53.48	143.4
Diarrhœa and Dysentery	73.0	465.6	15.62	35.27
Pneumonia	61.7	27.4	6.34	28.87
Eruptive Fevers	40.5	8.2	4.50	18.36
Continued Fevers	13.6	20.5	11.60	12.45
Malarial Fevers	12.6	12.2	5.04	16.81
Scurvy	1.3	102.8	0.16	2.02

The causes of the large mortality from diarrhœa and dysentery, pneumonia and the eruptive fevers, will be better understood by investigating the sanitary surroundings of the captives as described in the monthly reports of the Medical Inspectors. From these documents the following accounts have been compiled:

PRISON-CAMP AND HOSPITAL AT CAMP DOUGLAS, NEAR CHICAGO, ILLINOIS.—This camp was established in January, 1862, and closed in September, 1865. Its situation was within one-fourth of a mile of the shore of Lake Michigan, and about one and a half miles from the southeastern suburbs of the city of Chicago. The site was a flat and treeless prairie about fifteen feet higher than the level of the lake. It had been previously used as a fair-ground. The enclosed area measured 80 acres, nearly one-half of which was set apart for prisoners, the remainder for the garrison and hospital. The soil was a sandy loam on a substratum of blue clay. As the surface of the camp was not favorable to drainage it was often, in the wet weather of its earlier history, softened and muddy, unpleasant

* See Table XV, page 34.

† See *supra*, page 33.

and unhealthy. The buildings were at first poorly constructed wooden shanties arranged in parallel lines, east and west, with avenues between. The whole camp was in form a parallelogram, one long and one short side being used for prisoners, the other short side for officers and the other long side for offices. The average size of these buildings was $48 \times 25 \times 10$ feet, with kitchen in the rear 8 feet distant. These kitchens were small and were used also as messrooms. The whole camp was surrounded by a high wooden fence, and the barracks being in close proximity to it, very little fresh air, according to Dr. KEENEY's report for September, 1862, found its way into the dark, dingy and poorly ventilated quarters. In the month mentioned 7,798 prisoners of war were confined in this camp.

An extensive fire which occurred shortly after this destroyed a large number of the barracks; the buildings by which they were replaced were of a much better character in all particulars. The inspection report for December, 1862, says of this: "Some of the barracks have been burnt and others more substantial have been built in their places. The recent conflagrations have been attended with one salutary effect, in the immense destruction of animal life, in the form of lice, and had less of the filthy and rickety quarters been spared still greater salutary effects would have been the result."

The report for June, 1864, says that these quarters were "one-story high, frame, illy constructed, floors raised four feet from the ground, ridge ventilation and openings at side and ends ample in number." Their condition was further improved subsequently, for the report for October, 1864, says of them: "Fifty-two in number, each $70 \times 24 \times 7.8$ feet, with kitchens $20 \times 24 \times 7.8$, attached, in good order; eight new ones in course of construction."

In January, 1865, they were described by Dr. COOLIDGE as follows: "The prisoners of war are confined within an area of about forty acres, surrounded by a strong oaken barricade twelve feet in height, surmounted by a railed platform for sentinels. The prison barracks are one-storied, ridge-ventilated buildings erected on posts four to six feet from the ground, to prevent escape by burrowing. These barracks are sixty-four in number, four of which are for convalescents exclusively; thirty-one have been built since January, 1864. They are arranged in streets of suitable width, and are all of the same dimensions, viz: 90 feet long, 24 feet wide and about 12 feet to eaves. * * * Each barrack is subdivided into a kitchen and dormitory, the former 20×24, the latter 70×24, the dormitories fitted up with wooden bunks three tiers in height. In several of the barracks at the time of my inspection there were 165 men, each having a cubic space of 142 and a superficial area of 10 square feet. The prisoners of war confined in this camp, January, 1864, numbered 5,649, and 7,652 were received during the year, making a total of 13,301. The cases of sickness treated during the year amounted to 23,037, and the deaths to 1,156, of which 416 were from small-pox. The number of prisoners present December 31, 1864, was 11,780, of whom 577 were sick in hospital and 1,547 in quarters."

The prison hospital building, in common with that of the post, was described, in September, 1862, by Dr. KEENEY as follows: "The hospitals are pretty much the same as the men's barracks; though isolated from them they occupy grounds in the square. They are more thoroughly ventilated, but still are very defective in this particular; on an average 23 patients occupy a ward where 7 should be, allowing 1,000 cubic feet of air to each patient."

In the report for the following month Dr. KEENEY says: "The hospital accommodations of this camp have reached their utmost limit, * * sickness is on the increase." He recommended that the serious cases be transferred from the camp hospitals to the general hospitals at Chicago, and this appears to have been done.

The building is described in the inspection report for June, 1864, as follows: "One building, two stories high, with two wings, newly built, well-constructed frame, enclosed by a high board fence, well ventilated by the ridge and base, windows and high stories; 180 beds, and 117 in pest hospital; air-space, 800 cubic feet in hospital and 1,200 in pest hospital; total beds, 297."

The pest hospital was composed of two buildings, isolated and comfortable in every way.

The report for October, 1864, says: "Buildings, two two-story pavilions, two one-story pavilions, and one barrack for convalescents, all in good condition; six wards, 325 beds; air-space, 650 cubic feet; superficial feet, 54 each; overcrowded." At this date there were 7,361 prisoners of war in camp, 397 in hospital and 860 in quarters.

In January, 1865, Dr. COOLIDGE described the buildings as follows: "The prison hospital is within the garrison grounds but outside the prison square, enclosed with a strong oak fence. It consists of a central building with two wings, all two stories in height; four wards in each wing; the lower are 99 feet long, 27 feet wide and 12 feet high, well lighted and ventilated by cold-air shafts opening in the floor and vertical shafts in the walls, opening some near the floor, others near the ceilings. The upper wards are $99 \times 27 \times 11$ feet, well lighted and ventilated by shafts opening at the ridge. At time of inspection each of these wards had 60 beds occupied, so that each bed had 500 feet of air-space and 45 feet of area. * * * In addition to the hospital proper there was a single barrack ward 80×20 feet, with 30 beds for erysipelas."

The pest hospital was about one mile from the camp, and consisted of two ridge-ventilated frame buildings, 204×28 and 10 feet to eaves; divided into three wards, 150 beds. During the year 1864 1,519 of the prisoners were admitted with small-pox or varioloid, and 416 of these died. During the same period 144 cases were admitted from the Union troops at the post, and of these 24 were fatal.

Few alterations were made in these hospitals after this date except in minor points, all of which tended to improvement.

The diet of the prison-camp was the ordinary army ration with vegetables added. Some complaint was made of a scarcity of these by Dr. KEENEY, who said in September, 1862,—"I am inclined to believe the prisoners have been stinted in vegetable matter. The best indication of this is the appearance of the scurvy lurking about the command. There are many cases of incipient scurvy in camp." But the inspection reports of later dates speak of the rations as good and sufficient.

The diet in the prison hospital was rendered superior to that of the prison by the addition of delicacies pur-

chased by the hospital fund, which appears to have been expended in this manner as fast as it accrued. Dr. COOLIDGE reports for January, 1865, as follows: "The purchases by the hospital fund were as follows: (Some items only.) Milk, 1,237 gallons; potatoes, 167 bushels; dried apples, 427 pounds; butter, 994 pounds; chickens, 20 dozen; oysters (cans), 5 dozen—a great contrast to the treatment of our men in rebel prisons." Excellent soft bread was issued from the post bakery at all times to the prisoners in camp and hospital.

An abundant water-supply was brought from the lake to the camp by the city water-pipes.

The drainage of the camp was at first imperfect. Dr. KEENEY speaks of it thus: "The drainage is exceedingly bad. The commanding officer and the surgeon have repeatedly submitted plans of drainage to the department, urging the necessity of such as a means for preserving the health of the camp. As yet, nothing has been done but to permit long open sewers, extending for nearly a quarter of a mile, both in front and rear of the quarters, containing the garbage and other refuse of the kitchens of months' standing, to add their miasms to the already noxious air pervading the camp." Again, in October, 1862: "The grounds are so low that no drainage, without much expense, can be had. Every rain converts the camp into a mud-hole, and in consequence of the flatness of the ground and the want of drainage, all the filth and refuse of the company quarters, of the men's sinks, and of the hospital, are to be removed *only* by the process of evaporation. Already there exists in and around the company quarters and hospital sufficient animal and vegetable matter to contaminate the whole camp and generate fevers of the most malignant type." This condition of affairs appears, however, to have been remedied, for the report for June, 1864, speaks of the drainage as "naturally bad, but artificially good." The camp was well graded, and a system of sewers built which could be flushed into the lake.

The sinks at early dates were shallow pits, many of them merely surrounded by a few poles and brush insufficient to afford privacy. Dr. KEENEY, in his report for September, 1862, says: "The sinks are numerous, near the men's quarters and badly constructed; they are not sufficiently deep, nor are they filled up often enough and renewed. The wood-work is not close enough, consequently the mephitic gases are wafted to the quarters, hospitals and over the parade grounds. This stench is intolerable." At a later period these privies were built over a large sewer and the excreta effectually removed by flushing.

PRISON AND HOSPITAL AT ALTON, ILLINOIS.—The prison at Alton, Ill., was opened in January, 1862, and closed in June, 1865. Its site was that of the Illinois State Penitentiary, on the hillside at the northern end of the city of Alton, overlooking the Mississippi river, high, dry, well-drained and considered healthy, though subject to malaria from the river bottom at certain seasons of the year.

The buildings, nearly all of limestone, formed a square which was surrounded by a high wall. Many of the smaller buildings, used as executive offices, etc., were isolated. The north side of the prison was formed by a building containing 256 cells, arranged in four tiers in the interior, each tier consisting of two rows facing the north and south walls respectively. The cells were each $7 \times 7 \times 3\frac{1}{2}$ feet $= 171.5$ cubic feet; they were ventilated and lighted by the gratings which formed their doors. They were used only for refractory prisoners or when the prison was crowded, which the inspection reports show to have often been the case, particularly in the earlier months of its occupation. Bunks were erected along the corridors, between the central cell structure and the walls of the building. In addition to this there were two large rooms, each $45 \times 15 \times 10$, occupied as quarters, one of them at one time exclusively by Confederate officers.

Dr. LE CONTE in his report for May, 1863, says: "In the main building many of the cells are occupied by men who are not confined therein, but sleep there for want of better place." He recommended that "the capacity of the prison should be considered as not greater than 1,000, and that not more than that number should be confined within it at one time." The prison had been built to accommodate 300 convicts, and at the time of Dr. LE CONTE'S visit it contained 1,500 prisoners. Dr. KEENEY in his report for July, 1863, says: * * * "Fifteen hundred prisoners, both Federals and Rebels, have each about 100 cubic feet of *impure air* for respiratory purposes. This deficiency of pure air alone is a sufficient cause to explain the great mortality within its enclosure." In August, 1863, there were 1,200 prisoners; in October, 1863, 1,446; and in November, 1863, 1,800.

In order to afford increased accommodations for the prisoners, tents were at times erected, and the prison hospital was removed from the permanent stone building to one specially erected of wood, thus giving additional space for the inmates of the prison.

The reports at first speak of the hospital as consisting of one large ward in the basement of the penitentiary. In April, 1863, the hospital department was removed into a separate brick building in the prison yard, having room for 70 beds. An additional building was used as a pest-house.

In August, 1863, out of 117 sick in the hospital 60 were small-pox patients, and to properly isolate these a new building was erected at "Sickleyville," on an island in the river about three-quarters of a mile from the town of Alton. This building was of wood, well built and comfortably arranged; capacity, 100 beds with 670 cubic feet of air-space per bed.

In order to afford increased accommodations for the relief of the over-crowding in the prison quarters, a new two-story wooden pavilion building was erected inside the prison enclosure as a hospital, and all the permanent buildings were henceforth used as quarters. This new prison hospital was divided into two wards, $183\frac{1}{2} \times 40 \times 13 =$ 95,420 cubic feet each, the lower story being used for executive purposes, the upper only for the sick. A fine and well-appointed bath-room was attached to this ward; in fact the hospital arrangements were complete in every particular. The small-pox ward on the island was $200 \times 26 \times 13$ feet clear $= 67{,}000$ cubic feet, and had 67 beds. It was well constructed, one story, with roof and side ventilation. Thus the hospital accommodations at this place were at length made comfortable and complete.

The rations of the prisoners in quarters and hospital are reported as abundant and good. The hospital fund,

as it accrued, was liberally expended in the purchase of delicacies for the use of the sick, the surrounding farms furnishing vegetables in abundance.

The water-supply was at first hauled from the river to the prison by teams; later a steam force-pump was employed and an abundant supply was obtained.

The sinks were at first shallow pits situated too near the quarters, often over full and foul-smelling. At this time no water-closet was attached to the hospital, and the excreta had to be removed by hand. But these defects were remedied. The report for April, 1865, says of those attached to the hospital—"Water-closets clean and buildings good." The remarks on those of the prison are less satisfactory: "Water-closets and sinks ample but as foul as possible." In fact the condition of the sinks in the prison was generally severely criticised by the medical inspectors. The bathing facilities were characterized as "ample and good, with good furniture and fixtures."

The drainage was naturally good and the sewerage satisfactory during the early occupation of the prison; but in April, 1865—"most of the sewers having been clogged with trash, have been opened their entire length, and are open gutters of fæces, slops and all kinds of filth. The sewers not thus opened are choked: consequently the whole establishment stinks intolerably and the stench extends to the private residences in the vicinity of the prison walls. It is proposed to put earthen sewers here, and the work should be done at once."

The following extracts show the condition of this prison when at its worst:

Dr. KEENEY, November, 1862: "The quarters are poorly ventilated, and some have no ventilation at all.

The grounds and quarters are in a shocking condition. The prisoners are permitted to lounge about in their filth, with no other duty to perform seemingly than to amuse themselves by slaughtering the vermin crawling about their filthy persons. This seems to be their general avocation and amusement.

The kitchens are shining with grease, the floors seldom washed, the tables and other kitchen furniture also filthy.

The cooking arrangements are good; the ranges large and ample for all purposes.

The rations furnished are of the best quality, excepting flour, which is bad. But there is a great disproportion between animal and vegetable matter, a deficiency of the latter. Unless more vegetable matter is furnished scurvy will soon make its appearance.

The grounds around the company quarters and kitchens are the common receptacles for bones, damaged meat, mouldy bread, etc.

The prisoners do their washing on a slope where all the soapy water runs upon the ground and dries up under their feet.

The sinks are located in their midst and are exceedingly foul; the pits but three or four feet deep. There is no drainage to them, consequently they soon become filled up, and if not often removed they become an intolerable nuisance; such is the case now. I have called the attention of the commanding officer to this, and have recommended them to be filled up and new pits dug twenty feet deep and walled up.

I also find prisoners occupying the cells where the air is cold and damp and without ventilation, and where pneumonia and rheumatism were fast increasing. As these occupants were not condemned to the cells, I recommended the commanding officer to remove them immediately to a large open room where the sun's rays might occasionally brighten their dingy walls.

As above stated, there are 1,040 prisoners inside these walls. Sick in hospital 60; in quarters 70; total 130. The prevailing diseases are erysipelas, pneumonia, dysentery, typhoid fever and diarrhœa. The prevalence of the last disease arises from the sour bread furnished by dishonest contractors, under the administration of an inefficient commanding officer.

The hospital accommodations consist of one open ward with low ceiling and badly ventilated. The walls are dingy, the floors dirty, the bedding filthy, and the patients unwashed and alive with vermin.

The medical attendants, four in number, are Confederate prisoners of no account as medical practitioners. Dr. HARDEN has not time to give his attention to individual cases. The ward is now crowded, one bed riding another. In this loathsome ward each patient has about 200 cubic feet of foul air for respiratory purposes. Among the sick I found some eight or ten cases of erysipelas fast running into a contagious form. It is on the increase."

Dr. KEENEY, July, 1863: "The percentage of deaths has been as high as 30. Through the able administration of its present commander, Major HENDRICKSON, U. S. Army, and its present medical officer, Assistant Surgeon WALL, 77th Ohio Volunteers, the mortality has been reduced to 12 or 15 per cent.

The general state of police of the entire prison is now almost faultless, including the two wards used for hospital purposes. The rations are issued in abundance and of the best quality, and the cooking is both well done and served. The patients in hospital, some 85, are well provided with underclothing from the Government, and are amply supplied with everything to make them comfortable as far as the present capacity of room will permit. In this there is a sad deficiency, and humanity demands an immediate change for the better. In one ward, in the very midst of these 1,500 prisoners, there are 20 or more cases of small-pox under treatment; in the other and only ward are typhoid and malarious fevers, erysipelas, scabies, pneumonia, etc., etc.

Erysipelas often makes its appearance, assuming a contagious form from the vitiated air and animal poisons constantly being eliminated from the body. In fact, all forms of disease that would be mild with plenty of pure air, have in these dingy and loathsome rooms assumed the most virulent forms and baffled medical treatment.

In order to check in a measure this great and unnecessary mortality from disease, I have recommended the commanding officer to procure immediately a suitable building a mile or so from the prison and city, and have it fitted up for the accommodation of the small-pox cases.

As this loathsome disease seems a constant inmate of the prison in spite of vaccination, it will be necessary to keep up the small-pox hospital continually, and to employ an able physician to attend to this hospital alone. The persistence of small-pox in the prison is due to constant importations of the disease.

I have also recommended that the best ventilated and most isolated rooms now occupied by the well prisoners be appropriated to the erysipelatous and other contagious diseases, and the room now occupied by the small-pox cases be turned over to the well prisoners as soon as it is in proper condition to receive them.

I would also call your attention to the great necessity of immediately authorizing Major HENDRICKSON to employ two able physicians, one to attend to the small-pox hospital as soon as opened, and the other to assist Dr. WALL to attend the prison hospital. The duties in this hospital are too much for one man to do justice to the numerous bad cases of disease.

If these suggestions are carried out the condition of the sick will be ameliorated and the percentage of death lessened."

PRISON-BARRACKS AND HOSPITAL, ROCK ISLAND, ILLINOIS.—This prison was established November 13, 1863, and discontinued about August, 1865; the prison hospital was opened in December, 1863, and closed in June, 1865.

Rock Island, embracing about 1,000 acres, is situated in the Mississippi river between the cities of Rock Island, Illinois, and Davenport, Iowa. The soil is a stiff loam on a limestone foundation. Its well-wooded and undulating surface was considered to offer a healthy site for a prison-camp.

The barracks consisted of eighty-four one-story wooden pavilions, each of which was considered suitable for the accommodation of one hundred men. They were well built and comfortably arranged, ventilated by the ridge and well lighted; their floors were raised from the ground, and were comfortably bunked. They were built in streets 100 feet wide, crossing each other at right angles, and there was a central avenue 200 feet wide. Each barrack was 100 feet long, 22 feet wide and 10 feet high, but 20 feet of each was partitioned off to form a kitchen and mess-room. The whole area, 1,200 × 850 feet, was enclosed by a strong wooden fence 12 feet high, with a railed platform near the top on which the guard patrolled.

Dr. TOWNSHEND reports the result of his inspection in January, 1864, thus: "The prisoners on the island number 6,500. They are comfortably quartered in barracks well built and well arranged for comfort and security. The appearance of the men is highly creditable to themselves and to the officers having them in charge. In good weather the prisoners are employed in various duties, which secure to them the benefits of out-door exercise; these duties are therefore regarded by them as a privilege. The discipline of the prison is admirable, being efficient without being harsh."

The prison-hospital buildings, from January to April, 1864, consisted of a number of the barrack pavilions inside the prison enclosure. At the last-mentioned date ten of these barracks were used as hospital wards; but in May a new prison hospital was opened for the reception of patients. The buildings consisted of seven one-story frame pavilions arranged *en echelon*, tolerably well constructed, with ridge ventilation along the entire length of the roof. Each ward contained 50 beds and had a lavatory, bath and water-closet attached.

The increasing necessity for additional hospital accommodations caused seven additional pavilions of the same pattern to be erected, and the inspection report of January, 1865, describes them as follows: "The prison hospital is situated on elevated ground near the centre of the island. It consists of an administrative building two stories in height, 60 × 40 feet, and fourteen pavilion wards, each 140 × 24, 10 feet high at the eaves and 14 feet to the ridge, a small space being partitioned off for nurses and attendants; 50 beds to each ward, giving a cubic space of 645 feet to each bed." A kitchen and mess-hall was also erected, 112 × 40 feet, situated between the two rows of wards; to this building was also attached a well-supplied laundry.

In addition to the above there was a small-pox hospital consisting of six pavilion wards, each 150 × 24 and 12 feet high to the eaves. Each ward contained 50 beds, and gave 864 cubic feet and 72 square feet per bed. These buildings were isolated from the hospital proper, being situated on the Illinois side of the island. They were well drained and supplied with every convenience.

Notwithstanding the natural advantages of the site and the substantial and complete character of the buildings at this place the rates of sickness and mortality appear to have been high, chiefly due to an outbreak of small-pox. Dr. TOWNSHEND's report, already quoted, says: "The present condition of the hospital may be considered good; but much suffering has occurred, and many deaths during the present month from causes beyond the control of the officers in charge. Many of the prisoners arrived during the extreme cold weather, a large proportion of whom were subsequently attacked with pneumonia. The same cold weather interfered with railway communications and prevented the receipt of hospital stores and medicines. In addition to the above, many of the prisoners were found to have small-pox, and, of course, had subjected many others to exposure. These unforeseen difficulties appear to have been met with the utmost promptitude by the medical officers and the post commander."

The diet of both the prison and the hospital was always of good quality, ample means being afforded for cooking the rations. No complaints appear under these headings in any of the inspection reports. In the hospital the fund was liberally expended in the purchase of delicacies for the use of the sick. Good light bread and corn bread, with potatoes three times a week, were issued to the prisoners.

The water-supply was abundant and of fair quality. It was pumped from the Mississippi river into a reservoir and distributed to the camp and hospital by pipes. An artesian and three ordinary wells inside the prison enclosure furnished a good supply in addition to that from the river.

The sinks were at first simply pits, from which the accumulations were removed by carts and thrown into the river. At later dates these were abandoned and a large latrine was constructed in the prison, communicating with the river by means of a trench. Daily flushing swept the deposits into the river. The sinks in the hospital were provided with zinc buckets, which were emptied twice daily.

PRISON BARRACKS AND HOSPITAL

AT ROCK ISLAND ILL.

1 Stockaded Prison. 2 Prison Hospital. 3 Pest house. 4 Barracks of the Guard. 5 Hospital for the Guard.

The drainage of the camp and hospital was naturally good on account of the rolling surface of the ground; and this was improved from time to time until the drainage system was considered excellent. Between the prison and the hospital there was a slough or bayou of some extent which was partly filled up and drained. Complaint was sometimes made in the inspection reports of the unsatisfactory character of the drainage in cold weather when the drains were frozen up.

The following, by Assistant Surgeon M. KING MOXLEY, U. S. Vols., is dated February, 1864:

"The prevalence of small-pox and its proportionally great mortality is a subject of serious consideration. The disease made its appearance about the last of December. The number of those affected increased so rapidly that men had to be allowed to remain in barracks after the eruption appeared, thus infecting the whole prison. Three small houses were used as a pest hospital. Each was capable of containing ten patients, but three times as many were crowded into them. Two large buildings were erected soon after I assumed charge, January 13, 1864. These held 50 patients each, allowing over 800 cubic feet of air per man. But as the number of cases augmented to an alarming extent, I asked the commanding officer for the erection of another similar building. Five days elapsed before the order was given to build. Meanwhile the cases increased on my hands; there was no place to put them but in one of the barracks used for hospital purposes in the prison enclosure; this was filled in two days. Surgeon A. M. CLARKE, U. S. Vols., Acting Medical Inspector, found me with 38 cases in the barracks, the accumulation of two days, although I was removing them at the rate of twenty a day and crowding the pest-hospital in hopes of soon getting into the new building. Had this building been erected when asked for, no case would have been left in the barracks an hour after being reported. Another of the prison-barrack buildings was then taken, and then another, and one more barrack used as a ward in the hospital, making four used as small-pox wards within the enclosure. About February 22, for several days as many as thirty-five new cases were reported daily, and during the last two weeks of February there was an average of 20 cases each day. Three new barracks at the pest-house were erected, making six in all. One of the small houses previously used is now used as a kitchen. The four barracks in the hospital and prison are now cleared of the small-pox; all the patients are in the six barracks and two small houses. There are at this time, February 29, 430 cases; each building, intended for 50 men, contains 70, including the nurses. A house is being erected as a dormitory for nurses; this will leave more room for the patients daily reported. There has been a scarcity of clothing for convalescents returning to prison, although I made a timely application for a supply. Hence, many had to be retained who could have made way for new cases. The great mortality results from several causes: 1st. Over-crowding, which could not be avoided. 2d. Want of proper bedding, rough cots with straw being the only beds that could be procured, though now there are in use about two hundred bed-sacks which were obtained from the quartermaster. 3d. Want of clothing to give the patients a change on coming into hospital, in view of their previous want of cleanliness. 4th. Insufficient vaccination. Nearly every prisoner had a large ugly scar on his arm, the result of impure virus imposed on him while in the Southern army. This did not protect him in the least. Prisoners have been received on whom the eruption appeared the next day following their arrival, thus showing that they had contracted the disease before coming here."

PRISON AND HOSPITAL AT CAMP MORTON, NEAR INDIANAPOLIS, INDIANA.—This depot, used as a camp for Union troops from April, 1861, was opened as a prison for rebels January 26, 1862, and closed in August, 1865. It was established on the State fair-ground, one mile and a half northwest of Indianapolis, Indiana. The site was a level plain, undulating but slightly in some parts, and hence possessing very poor natural drainage. The soil was an alluvial clay on a subsoil of gravel. The area enclosed for prison purposes was at first about twenty acres, subsequently increased to thirty, and was abundantly shaded by fine forest trees. The great objection to the site was the absence of running water, which deficiency was repeatedly noted by the various medical officers who inspected the post.

The prison barracks at first consisted of a number of poorly constructed wooden buildings which had been erected and used by Union troops. They are described in July, 1864, as "nine dilapidated barracks, each 150×24 and 10 feet high." The ventilation of these was by ridge openings running along the entire length of the roofs and by openings in the walls and doors at the ends and sides. They were fitted with three tiers of bunks. At this date there were also 210 condemned tents in use for the accommodation of the prisoners. Nevertheless these quarters were much crowded, there being only 60 to 80 cubic feet per man in the barracks, while five men were crowded in each "A" tent and nine men in each bell tent. A small isolated building within the enclosure was used for a few cases of variola that occurred. This crowded condition continued until September, 1864, when the prison area was increased by adding to it about ten additional acres of ground. In November, 1864, six men were crowded into each "A" tent while new pavilion barracks were in process of erection. In May, 1865, the barracks were stated as thirteen in number, each 150×18 feet and 9 feet high, giving "sufficient space." Little change appears to have occurred after this date.

Hospital buildings were at first extemporized by the occupancy of some of the prison-barrack buildings already described. It appears that at this time many of the sick and wounded were sent to the Indianapolis City Hospital for treatment. In June, 1863, the stated capacity of these buildings was 83 beds, occupied by 100 men, many of whom were on double beds. The report for July, 1863, says: "Enlarged hospital accommodations are much needed at this place. The present facilities are too limited and are often crowded beyond their capacity." In these buildings the air-space was often reduced to 350 feet per man. Few facilities were afforded for bathing; bath-tubs were in position, but as water had to be carried a distance of one hundred yards in buckets, they were seldom used. To expand the hospital a number of tents were pitched, but these also soon became crowded.

In December, 1863, the hospital department was much improved by the erection of two new pavilion buildings, by which the air-space was increased to 550 cubic feet. In July, 1864, these buildings were described as follows:

"The hospital buildings are four in number, one 114×20 and 12 feet high; one 100×20 and 12 feet high; one 40×20 and 11 feet 3 inches high; and one 99×24 and 14 feet high. Furniture good and sufficient. In addition a mess-room 30×24 feet, 12 feet high, and good kitchen accommodations."

The diet in both prison and hospital was good and sufficient; vegetables were freely used and the hospital fund liberally expended in the purchase of delicacies for the sick. Soft bread of excellent quality was issued daily from the post bakery.

The water-supply, derived from wells, was sufficient for the requirements of the camp. Drainage at first was imperfect. A ditch of irregular depth ran through the camp and carried off the rainfall. In dry weather stagnant water collected here and there in the deeper parts of its irregular bottom. These were repeatedly denounced by inspecting officers, and as a result the ditch was ultimately straightened deepened and converted into a main drain with which laterals from the area of the camp were connected.

The sinks were simply pits in the ground within the enclosure, and often so near the quarters of the prisoners as to be offensive. Lime was used daily as a disinfectant.

The condition of the camp during the last year of its occupation is not known, as no detailed accounts of a later date than July, 1864, have been found on file.

The figures for Camp Morton, presented in Table XVIII, do not include the statistics anterior to June, 1863. An estimate of the mortality previous to that date is contained in the report of Dr. HUMPHREYS for September, 1864, as follows: "There have been treated in the City Hospital of Indianapolis 846 rebel sick and wounded. They were all of the Fort Donelson prisoners; out of this number 75 died. The men were broken down in health by previous hardships and exposure. The limbs of many were frosted while working in the trenches at Fort Donelson. The prevalent diseases amongst them were typhoid fever and typhoid pneumonia, occurring in persons in whom the vital forces had been reduced to the lowest possible degree; many 'dropped dead' while walking about their quarters, without having manifested any disease, organic or functional, except great general debility. In persons of this class, while moving about looking apparently in medium health, the action of the heart and arteries would be so feeble as to be scarcely perceptible in pulsations at the wrist. These men were subsisted and treated medicinally and surgically in the same manner as the sick and wounded of the United States forces; the same air-space in hospital, and every facility afforded our own troops were given to the rebels. The records of the number of rebel prisoners received at Camp Morton since the commencement of the war are incomplete. Colonel BIDDLE of the 71st Indiana Infantry has been in command of the camp since the 28th of January, 1863. This officer reports the number of prisoners of war in this camp since the above date to June 10, 1863, to be 4,604. The sick in hospital out of this number were 591; of whom 43 died. About one-half of the 591 treated were wounded, among whom were many cases of hospital gangrene. The total number of rebel prisoners brought to Camp Morton since the war began exceeds 10,000. From the undertaker who personally superintended all the interments of the rebel dead at this post, I learned that the total number of deaths up to May 8, 1863, amounted to 353; total number of hospital cases treated in the period referred to 1,685."

PRISON-CAMP AND HOSPITAL AT JOHNSON'S ISLAND, NEAR SANDUSKY, OHIO.—The inspection reports of this prison-camp present a most gratifying picture of its sanitary condition. It was opened some time in 1862 and closed in October, 1865.

The island, three and one-eighth miles from Sandusky, Ohio, has an area of 360 acres. Its natural advantages as a depot for prisoners of war were very great; the soil was alluvial on a limestone basis; the drainage excellent; water from the lake abundant and of good quality, and the salubrity of the site unsurpassed.

The buildings in the camp, frame structures two stories high, with bunks along the sides, were well lighted and ventilated by doors and windows, and at a later date by artificial openings. They accommodated 2,000 men, giving an air-space of 300 feet per man. Their capacity was largely increased in 1864. The prison-camp was surrounded by a high board fence, enclosing an area of 15 acres. Officers were mainly confined in this prison.

The prison hospital was a two-story frame building, giving 700 feet of air-space to each of 80 beds. It was divided into four wards with lavatories in each. Bathing facilities were afforded by the abundant water-supply from the lake. The supply of bedding was abundant. The diet was similar to that furnished to the Union soldiers in the post hospital. Ice was furnished in abundance. Vegetables and delicacies were freely used. The medical officer in charge was assisted by Confederate surgeons confined in the prison.

The sinks at first were excavations in the ground, but later box-sinks, capable of being drawn out and emptied into the lake, were substituted for the old vaults.

The natural advantages of the site rendered but little artificial aid necessary to perfect the drainage. Garbage was stored in barrels and carted daily from the camp.

The following extract from the report of Surgeon T. WOODBRIDGE, 128th Ohio, in charge of the hospital, sums up the conditions affecting the prisoners under his care in a few words. The report is that for June, 1863: "The rations are of good quality and the cooking excellent. We have plenty of vegetables and an abundance of fresh fish; pure air; pure water; plenty of wood; a police system rigidly enforced; a natural salubrity unsurpassed. We are as perfect in what pertains to hygiene as possible."

PRISON-CAMP AND HOSPITAL AT CAMP CHASE, NEAR COLUMBUS, OHIO.—The precise date of the establishment of this camp and hospital is not shown by the records of the Surgeon General's Office. It was used as a prison-camp for political and military prisoners early in 1862, but the reports on file antedating January, 1863, are valueless. The hospital was not closed until December, 1865, although few prisoners remained after July of that year.

Camp Chase prison was situated in the southeastern part of the enclosed camp, four miles from Columbus, Ohio, on the National road. The site had previously been a race-course and fair-ground; it was treeless and nearly flat or

somewhat basin-like, and surrounded by forests, which made it close and warm in summer. The soil was stiff, clayey and water-holding, poorly drained and destitute of running water.

The buildings in the prison-camp at early dates were poorly constructed wooden barracks, needing constant repairs to render them habitable. Dr. HUMPHREYS considered them little better than the huts ordinarily in use for the protection of domestic animals. They were divided into three sets, known as prison No. 1, for officers, and Nos. 2 and 3 for enlisted men. Each prison was separated from the other, and the whole was surrounded by a close board fence, fifteen feet high, with an elevated platform for the guard. These old barracks were fitted with three tiers of bunks, and the space per man was very small. To accommodate the large numbers of prisoners received, tents were pitched in the avenues between the barrack buildings, and the crowding was great. The dimensions of these buildings and the particulars of their construction are not clearly stated. At the inspection in September, 1863, the quarters were crowded; at this time there were confined 1,753 prisoners, of whom only 27 were sick—25 in hospital and 2 in quarters.

During 1864 the prison underwent a radical change: its area was increased, its buildings remodelled, and some of a better character erected. Division No. 1 of the prison consisted of two barracks, No. 2 of seventeen barracks and No. 3 of twenty-seven, making a total of forty-six barracks. Each was $100 \times 22 \times 12$ feet, and was intended to accommodate 192 men, giving 137 cubic feet per man. They were all of the pavilion pattern, with door and windows at the sides, floors well removed from the ground, ridges ventilated, and the tiers of bunks reduced to two.

The prison-hospital building in 1862 and the early part of 1863 consisted of a small one-story wooden barrack, $79 \times 20 \times 12$ feet, divided into two wards, having 600 feet of air for each of 36 beds. It was situated within the enclosure and too near the high close fence for good ventilation. It was well supplied with furniture and cooking apparatus, lavatories and sponge-baths. The capacity of the hospital was increased about December, 1863, by the erection of a new pavilion, which, however, was of an inferior character. It was built of old lumber preserved from some condemned buildings. Its size was 84×12 feet and only 8 feet high, allowing a little over 400 cubic feet of air per bed. Both of these buildings were afterwards condemned and abandoned. New and superior hospital pavilions were erected outside the prison enclosure. They consisted of six wards each $100 \times 25 \times 12$ feet, affording 850 feet of air-space to each of 216 beds.

In addition to these, three isolated buildings south of the prison enclosure constituted the pest-hospital. Two were used for small-pox and one for erysipelatous patients. The small-pox hospital was $240 \times 24 \times 12$ feet, having a capacity of 120 beds, to each of which it afforded a cubic space of 576 feet. These buildings were of the pavilion pattern, well constructed and supplied with everything needful for the comfort and well-being of the patients. The attendance was good and careful and the supplies ample and of good quality.

In a special report dated March 14, 1865, Dr. COOLIDGE compared the barrack occupancy of the Union troops and Confederate prisoners.

BARRACKS FOR—	No.	Length.	Width.	Height.	Bunks.	No. of men to each.	Air-space.	Area.
		Feet.	*Feet.*	*Feet.*			*Feet.*	*Feet.*
United States paroled	18	100	24	12	48	192	150	12.5
United States garrison	20	60	24	14	48	96	210	15.0
United States recruits	20	60	24	14	48	96	210	15.0
Confederate prisoners	46	100	22	12	48	192	137	11.4

The diet in the prison-camp was the army ration with the addition of vegetables, potatoes, onions, etc., the post bakery at all times furnishing a good supply of light bread. There appears to have been a prisoners' fund, but no account of its expenditure is on record. The kitchens of the prison-barracks were furnished with brick furnaces having cast-iron tops with holes for kettles. There were few complaints made by the inspectors under this head, the whole appearing to be quite satisfactory.

The prison-hospital diet was of the same quality as that of the prison, with the addition of such delicacies as were purchased by the hospital fund, which was expended as fast as it accrued, and, according to the inspection reports, it appears to have been ample for the purpose.

The supplies in both prison-camp and hospital are spoken of throughout as having been good and sufficient.

The water-supply was derived from wells, which in the early months of the occupation were not commended, although they were regarded at a later period as capable of yielding an abundant supply of good but somewhat hard water for drinking and cooking; it was, however, never sufficient for bathing or washing purposes, and on a few occasions, after prolonged dry weather, the low water in the wells rendered some precautionary economy advisable.

In consequence of the nearly level surface of the camp great difficulty was experienced in effecting a satisfactory drainage. The system consisted of a main drain or ditch running through the prison-camp from west to east, with lateral branches opening into it. But, as in the absence of running water these drains could not be satisfactorily flushed, they became foul and emitted disagreeable odors. On the remodelling of the camp and hospital buildings the drains were planked or boxed, and provision was made for flushing the system by means of water from a cistern. The defective drainage of this camp, arising from its physical conformation, was noted in almost every inspection report, and the advisability of removing the prisoners to another and healthier site was frequently suggested.

The sinks at first were merely pits in which lime and ashes were used as deodorizers. Much difficulty was experienced in keeping them in good condition. They were afterwards filled up lest they should contaminate the water-supply, and new sinks were constructed over the drains, which were flushed periodically. Garbage was collected in barrels and carted off regularly.

Prison-camp and Hospital at Elmira, N. Y.— Elmira barracks were built at the beginning of the war as a general recruiting depôt; but in July, 1864, Division No. 3, of the barracks, called afterwards Camp Chemung, was converted into a prison-camp. This division was situated on the river-bank a mile and a quarter west of the town. The site was believed to be healthy; it was level, and having a sandy soil resting on a stratum of coarse gravel a few feet below the surface, afforded good underground drainage. At the date mentioned twenty of the old barrack buildings were considered fit for the occupation of the prisoners and ten new ones were constructed. The former, $88 \times 18 \times 8$ feet, were intended to accommodate each one hundred men. The latter, $80 \times 25 \times 12$ feet, were each fitted with bunks for one hundred and forty-eight men. Mess-halls and kitchens were suitably furnished. The barracks were built of pine; they were well lighted, warmed by stoves and provided with ridge-ventilation. The bakery could turn out six or seven thousand rations per day. Good water was obtained from two wells, and any deficiency was supplied from the river. Lavatories and baths were not at first specially provided. Drainage was by means of pits dug to the porous subsoil. The sinks were covered pits, which were filled up when necessary.

The grounds of the camp, comprising thirty-five acres, were surrounded by a fence twelve feet high with a platform four feet from the top. In August, over a thousand tents were pitched, each to accommodate five persons. In one inspection report the drainage is said to have been into an open pond within the camp, thus forming what was called a perfect pest-hole; but on the recommendation of the inspector this pond was afterwards drained and an underground sewer constructed, while defects in the surface drainage were remedied from time to time. Nevertheless the grounds were frequently reported as in a muddy condition during wet seasons.

The prisoners were insufficiently clothed, there being at the same time a great want of blankets, especially among the prisoners in quarters. A supply is said to have been received on one occasion from the Confederate authorities. Sometimes the want of clothing was incompatible with the maintenance of health, and hospital patients, after having sufficiently recovered to be up, were obliged to keep their beds for want of pantaloons. Needs of this kind, and others less urgent, on becoming known, were relieved by the issue of hospital clothing. Bedding was supplied in quarters only to the sick, and consisted of sacks of straw and a blanket. The men in confinement here had the full prison ration as supplied at the other prison depôts. They had also a fair supply of vegetables purchased by the prison fund. Desiccated vegetables were at first furnished, but as they were not acceptable to the prisoners, fresh onions and potatoes were substituted. Inspector Lyman reports on November 11, 1864, that onions and potatoes were supplied on three days out of five, and in each of his subsequent reports speaks of the supply of vegetables as sufficient. On one occasion he reported the beef as of inferior quality, but generally the diet is represented as good and well cooked, the kitchen being under the supervision of a special officer.

On the arrival of the prisoners, and while the hospital was in course of erection, the sick were treated in a pavilion set apart for their reception. Medical supplies and accommodations were deficient at this time. An inspection report dated July 15, 1864, says: "They are absolutely without the necessary medical and hospital supplies. Requisitions were made three weeks ago. Until the day of my inspection the sick were laid on the naked bunks from the inability to obtain straw. This was finally procured by the commanding officer after considerable difficulty, and arrived during my inspection. When the requisition for medicine and hospital supplies is filled they will be in every respect suitably provided in a sanitary view." In August, medicines were reported abundant; but the sickness was large and the mortality great. "This," said the inspector, "is due to the broken-down condition of the prisoners on their arrival." There were at this time 9,170 prisoners, of whom 553 received hospital attendance and 558 were prescribed for at sick-call.

The medical staff consisted of a surgeon in charge and eleven or twelve assistants. Confederate surgeons sometimes assisted in attending to the sick. Visits by the medical officer were made twice a day, and in special cases oftener; and any complaint against a medical attendant of inattention or harshness was promptly investigated. Competent persons were selected from among the prisoners to compound prescriptions and to act as nurses and cooks.

In August the hospital consisted of three wards of seventy beds each, and one of eighty-two beds, with 624 cubic feet of space per bed. On October 4th there were 9,063 prisoners, of whom 3,873 slept in the barracks and 5,190 in 1,038 tents. The air-space in the larger barrack buildings was 111 cubic feet per man, in the smaller buildings 92.5 cubic feet. There were 1,560 men on the sick report. The hospital had been extended, consisting now of six new wards averaging 62 beds each, with 654 feet of air-space per bed, and four barrack-buildings averaging 70 beds, with 342 cubic feet per bed.

On November 11, an additional hospital ward of 62 beds, with 654 feet of space per bed, had been completed, and one of the old 70-bed wards was vacated for use as quarters.

In January, 1865, with a view to diminish the sickness and lessen the mortality, the Medical Inspector made the following recommendations: "1st. That additional wards be constructed and provision be made for hot-water bathing of the sick. It is impracticable to give this thoroughly in the wards, and it is very much needed. 2d. That hospital clothing be allowed, which would afford an opportunity for cleansing the woollen and underclothing of the patients. 3d. That all the old barracks be provided with additional windows. In the winter season the men confine themselves to the wards as much as possible for warmth, and the closing of the doors and windows renders these barracks too dark. 4th. That more cubic and superficial space be allowed by the erection of additional barracks. The type of disease among the prisoners is that which results from over-crowding: there is no acute disease, everything assumes a typhoid type."

The condition of the camp at the date mentioned is thus described: "The whole appearance of this camp is greatly improved since the last inspection. The sick in hospital and quarters are now vigilantly watched; the food is good and well cooked; coal stoves have been substituted for wood, and the police of the barracks is quite as good, and, I think, better than in most regimental barracks." Small-pox broke out among the prisoners about this time. From December 1, 1864, to January 24, 1865, there had been 397 cases. To isolate these properly a small-pox hospital had been improvised with tents; but a new pavilion was being constructed to replace it. During January 5,600 vaccinations and revaccinations were performed. To replace, and afford better shelter than the tents, twenty-four new barracks, each $100 \times 24 \times 12$ and 3 feet pitch of roof, had been completed by the middle of March, and six more were in course of construction. These are said to have given 180 cubic feet of air-space per man. At this period there were 1,738 on the sick-list in a total of 5,934 prisoners, and many of those in quarters were very sick and stood as much in need of suitable ward-accommodation as those in hospital, into which, for want of room, they could not be received. "The condition of the patients is pitiable," says the inspector; "the diseases are nearly all of the typhoid type, and much of the sickness is justly attributable to crowd-poisoning. In addition to this, the clothing during the winter was insufficient. The deep mud prevents the exercise of the prisoners in the open air, and there is no occupation for most of them to relieve, in a measure, the depressing influence of prison-life. The Fort Fisher prisoners, especially, arrived in cold weather very much depressed, poorly clad, and great numbers were soon taken sick with pneumonia and diarrhœa, rapidly assuming a typhoid character. The surgeon was recommended to press constantly upon the commandant the necessity for appropriating some of the best barracks for additional wards, the *immediate* completion of the floor-ventilation, the alteration already commenced in the hospital latrines, and the free use of permanganate of potash throughout the barracks and of bromine in the wards. I would renew the recommendation, made in my January report, that additional light be given to the old barracks, and greater facilities for warm and cold bathing as prophylactic measures." Subsequently, up to June 22, 1865, the date of the last report, the sanitary condition of the camp and buildings is reported as having been good. The number of prisoners continued to diminish and the ratio of mortality grew steadily less.

Prison Depôt at Fort Delaware, Delaware.—This fort assumed importance as a prison depôt in June, 1863, when 8,400 men captured by General Grant in his operations against Vicksburg were sent to it for confinement. On June 3, Medical Inspector E. P. Vollum, U. S. Army, inspected the post in accordance with instructions from the Surgeon General, to determine the character and extent of the hospital accommodations to be provided. At this time barracks for 8,000 men were in course of erection. The condition of the post and prisoners when at its worst, that is, shortly after the arrival of this large body of men, is fully depicted in the following report by Assistant Surgeon C. H. Alden, U. S. Army, dated July 11, 1863, on the causes of the sickness and mortality in the camp:

"Fort Delaware is situated on an island in the Delaware river, below Philadelphia and nearly opposite Delaware City. The island has an area of about 90 acres and the soil is of a low marshy nature. Fort Delaware proper is a large casemated work of granite and brick, which accommodates but a small part of the inhabitants of the post. It has within it the different offices of the post, officers' quarters, rooms where the officers, prisoners of war, are confined, and guard-house for the prisoners of the U. S. troops. Outside the fort are numerous wooden buildings of more or less recent date, accommodating the rank and file of the prisoners of war, workmen, the hospitals, sutler's store, etc., with a few cottages for officers' quarters, and a number of tents occupied by the troops composing the guard. There are now some 7,100 prisoners confined on the island, including about 300 officers. The guard numbers about 800 men.

The barracks for the prisoners of war are two in number, the old and the new, each composed of one-story wooden buildings enclosing a rectangular piece of ground. They are ordinary shed-buildings with shingle roofs. The ventilation of these buildings is very defective. The old barrack has small windows along the side at considerable intervals, and a ridge ventilator along the whole length of the building. The new barrack, though somewhat higher, is still worse in its facilities for ventilation, the ventilators at the ridge being only occasional and placed at considerable intervals. The interior is arranged with a central aisle and on either side three tiers of bunks or rather shelves, inclining towards the centre. The prisoners lie on these shelves with their heads directed to the exterior of the building. In the old barrack are confined 3,500 men, a number, it seems to me, far too great for its capacity. A rough estimate, but I believe a tolerably correct one, shows that each occupant has less than 100 cubic feet of air, in connection with which should be remembered the small opportunity offered for the renewal of the air. The new barrack is not yet entirely occupied, owing to a portion of the building having given away and requiring repair. This will in a measure account for the crowding of the old barrack, which will, I was assured, be relieved as soon as the new is in condition to be occupied. There are also attached to the barracks mess-halls and kitchens. The mess-halls have long narrow tables at which the prisoners stand at meals. The barracks, mess-halls, kitchens and the prisoners themselves were in a very dirty condition; some portions of the buildings much more so than others.

The island is intersected by several ditches and inlets, but the drainage is very imperfect, and the grounds inside the prisoners' barracks were rendered very muddy by the recent rains. The water is now excluded from the moat around the fort to enable the workmen to build the counterscarp. The filth received into this moat from the drains and privies of the fort is therefore not removed by the water and lies exposed and decomposing, causing most disagreeable effluvia on a warm day. The water-closets for the prisoners, as well as for all those living outside of the fort, are on the edge of the island projecting over the water.

The water on the island is chiefly rain-water of good quality. At intervals along the outside of the barracks are tanks for the collection and storage of the rain-water. Of these there are a large number, and many of them appeared pretty full from the recent rains. There are also tanks connected with the hospitals and other build-

ings around the fort. Under the casemates of the main work are a series of large cisterns which are designed to be filled by the rain-fall on the parapets percolating through the earth, sand and gravel (forming a filtering arrangement), down into them. They are of large capacity, but at present have a small supply in them. When rain-water is scarce it has been the practice to send for water by vessel to the Brandywine; some of the water now on the island is from this source. The water of the Delaware river, which surrounds the island, is, I learn from credible persons who have lived there some years, considered entirely fit for drinking in the winter and early spring. At other seasons it is somewhat brackish. If taken at low-water, however, it is not even in summer considered decidedly injurious. As far as I could learn, and I took the statements of several officers and of the prisoners themselves, the supply of rain-water has as yet been sufficient for the garrison, and has been enough also to afford drinking water to the prisoners. The latter use the river water in part, if not entirely, for cooking purposes. With the present number of persons on the island the supply of water on hand would certainly fall short soon. Measures are, however, being taken, by bringing water from the Brandywine and by pumping up (by steam apparatus) water from the river, throwing it over the parapets and allowing it to filter through into the cisterns beneath, to obtain a good supply. A condensing apparatus has also been ordered.

The ration issued to the prisoners is the ration issued to the U. S. Army before the late increase in quantity. The meat is brought, already butchered, from the main land, and appears to be of good quality. The bread is partly baked on the spot and partly procured from Delaware City. The latter is very good, but the former, though of tolerable quality generally, appeared in one or two instances a little sour. Besides this, hard bread is also supplied to the prisoners.

There are five hospitals on the island, one for the garrison and four for the prisoners of war, all outside the fort. They are frame buildings. Two are old, badly ventilated and poorly adapted for the purpose; the three others are mere sheds, which have, however, the advantage of being tolerably ventilated through the chinks of the rough boarding. One of the wards of the post-hospital was particularly small, and though it had but 17 men in it, they had an allowance of less than 300 cubic feet of air per man; it was besides badly ventilated. Two hospital tents are also occupied by sick prisoners of war. All the hospitals, but more particularly those of the prisoners, were in poor police; the grounds around them particularly so. There was a great deficiency, or rather an almost entire want of stores, clothing and medical supplies of all kinds; bedding was also very insufficient. There were no bedsteads for most of the sick prisoners of war. A sufficiency of stimulants for immediate use is, I was informed, obtained through the Quartermaster's department.

Assistant Surgeon H. R. SILLIMAN, U. S. Army, is in charge. It is due to him to say that he was assigned to this post but a few days ago. I have no doubt he will immediately make efforts to have the defects above mentioned corrected. He informs me that four days since he made requisition for all necessary supplies on the Medical Director at Baltimore. The books and records of the hospital were in much confusion, or rather none were, I believe, kept except a register of the sick of the garrison and a morning report.

This want of correct records makes it difficult to obtain exactly the number of sick, deaths, etc., but the following data are believed to be tolerably accurate: There are 210 sick prisoners of war, among whom are included a few wounded just received from the battlefields in Pennsylvania. The morning report shows that there are 69 of the garrison sick, 24 being in hospital and 45 in quarters. The chief, and I may say almost exclusive, disease is chronic diarrhœa. Hospital reports reveal the fact that the disease and the incident mortality is almost entirely confined to the members of the rebel regiments from Alabama, Mississippi, and other southern states, taken prisoners by General GRANT'S army around Vicksburg. A large part of these men came hither broken down, emaciated and already the subjects, for some weeks or months, of this disease. The long journey from Vicksburg to this place seems to have exhausted all their vital powers, and many died soon after their arrival. There is very little sickness and hardly any mortality among the prisoners of war brought from General LEE'S army, or any other source than the army around Vicksburg. All are equally exposed of course to any imperfect hygienic influences existing on the island; but the fact that the sickness and mortality are almost entirely confined to the prisoners from Vicksburg, shows, I think, that the conditions under which they are now placed are chargeable neither with their sickness nor mortality.

It is important to bear in mind that the majority of the prisoners have been upon the island but a few days. The want of ventilation, the over-crowding and bad police of the prisoners' barracks, which I have mentioned, have not as yet had time to produce any marked effect on their health. I cannot but conceive, however, that serious results will ensue, if these causes are allowed to operate for any length of time, especially at this season.

I deem it my duty, in view of the pressing necessity of the subject, to call the attention of the commanding general to the want of ventilation of the barracks, the over-crowding and the want of police. The prospect of a deficient supply of water had fully engaged his attention, and he was using his best efforts to provide for it. He requested me to point out the fact that the tanks attached to the barracks should have been double the size, also the need of a water-tank boat for bringing water, and suggested that the new hospital for 600 beds, now in progress of contruction, should have tanks twice the size of those contracted for.

The attention of the medical officer in charge was called to the urgent necessity of taking measures to provide hospital stores and medical supplies. He was advised to make an immediate special requisition on Surgeon MURRAY, the Medical Purveyor at Philadelphia, for such articles as were most needed, stating the emergency. He was also advised to have the hospitals and the grounds around them thoroughly policed, applying for a detail of men, if necessary, and to have the buildings whitewashed inside. It was recommended to obtain additional hospital tents and remove into them the sick from the crowded wards of the garrison hospital, and also to have a pig-sty near one of the hospitals taken away. Several benevolent individuals having offered contributions, he was advised to accept

and invite them, especially of underclothing and hospital stores. This seems to be the more necessary, as at present there is no hospital fund with which to purchase extras.

The subject of allowing the prisoners to bathe unfortunately escaped my attention. I was informed, however, by one of the officers of the post, that it had not been permitted for the officers, and the condition of the men certainly indicated that they have not enjoyed any greater privileges in this respect. If occasional bathing could not only be allowed but compelled, it would of course contribute materially to the health of the prisoners, and there seems to be no good reason why, under proper and sufficient regulations, this could not safely be provided for."

PRISON-CAMP AND HOSPITAL AT POINT LOOKOUT, MARYLAND.—This camp was established in August, 1863, on the eastern side of the point at some distance north of the site of the Hammond General Hospital. In his report for July of that year Medical Inspector General J. K. BARNES, U. S. Army, mentioned the proposed settlement of ten thousand prisoners in the vicinity of the hospital, and called the attention of the Surgeon General to the fact that at least 700 of the beds of this establishment would be required for the use of the sick among this number of prisoners. The point was sandy and sparsely dotted with shrubby vegetation. The site was considered healthy. The prison-area was surrounded on three sides by a stockade; on the east side it opened on Chesapeake Bay. One or two gun-boats guarded the water-front of the camp. The prisoners were sheltered in Sibley and A tents, which were pitched in regular lines separated by well-graded streets. One division of the prisoners occupied cracker-box huts, built by themselves out of such timber as was obtainable on the point and shingle-like fragments of the empty hard-bread boxes. At first the sick were sent to the Hammond Hospital, but after a time a prison hospital, in which cases of a less severe character were treated, was established within the stockade. The water-supply was from a number of wells which yielded each from 500 to 1,000 gallons daily, but diarrhœa was sometimes attributed to its use. The soil of the camp-site was kept unusually free from excremental taint, as the sinks were built over the waters of the bay, which promptly carried off the deposited filth.

The first, and perhaps the only, report of special interest from this camp contains a protest against over-crowding. It was written by Surgeon JAS. H. THOMPSON, U. S. Vols., Surgeon in charge, June 30, 1864: "Several thousand prisoners captured during the present campaign have been received into camp during the month of June. Many of these were suffering from exhaustion and diseases incident to an active campaign. It will be perceived by a reference to the mortuary report that most of the deaths during the month occurred among these new arrivals. The types of all diseases occurring in camp have been more aggravated than during previous months. Wounds, though generally progressing favorably, have in several instances proved troublesome from gangrene and proneness to secondary hæmorrhages. Only one case of variola has occurred and fifty-five cases of measles: the latter disease is increasing, the former nearly extinct. Requisition has been made for vaccine lymph to protect the new arrivals.

Subjoined is an extract from a report forwarded to the commanding officer of the Post June 23, 1864:—

'I have the honor to call the attention of the commanding officer to the already crowded condition of the prisoners' camp at this post, and as sanitary officer of the camp to respectfully protest against the reception of additional numbers of prisoners, there being now fully fourteen thousand persons within the camp, and nearly twenty thousand on the point, including the U. S. Hammond General Hospital with one thousand three hundred wounded men, the contraband camp of indefinite numbers, the Quartermaster's department and troops of the garrison. In addition to these are the Quartermaster's stables with, I suppose, two hundred and fifty horses and mules.

The reasons why I am urged to make this protest are:

1st. The limited area of the camp and of the occupied surface of the point.

2d. The already insufficient and injurious quality of the water. According to the results of analysis the water of some of the wells is unfit for use, and to this I attribute largely the increased prevalence and fatality of disease during the past month.

3d. Though the police of the camp is, and has been for several months past, most excellent, still every precaution against epidemic disease, with this over-crowding of the camp not only continued but numbers yet to be increased, will, I fear, prove futile, and we may see ere the summer is past an epidemic that will decimate not only the ranks of the prisoners, but affect alike all the inhabitants of the point,—

I therefore recommend to the consideration of the commanding officer:

1st. That no greater number of prisoners or troops than at present occupy the ground be allowed upon the point.

2d. That condensers be at once put up to furnish a sufficient quantity of pure water.

3d. The diminished issue of salt pork and the largely increased issue of fresh vegetables; this in consideration of the scorbutic tendency and character exhibited in the majority of diseases occurring in the camp.

4th. The *immediate* construction of barrack-hospitals for the accommodation of two hundred sick.'"

The condensers were not furnished, but to supply the increased necessity for water a number of new wells were dug. Free issues of vegetable food were made to the prisoners and a post-hospital for sick were established outside the stockade. Large numbers of the prisoners were employed under guard on this and other work in the vicinity of the camp. The details for such duty were eagerly covered as furnishing occupation and change of scene, and entitling the laborer to extra rations or special issues of tobacco, as might be desired.

By orders dated August 31, 1864, from headquarters of the military district in which the camp was situated, the provost marshal was charged with the duty of inspecting the camp and hospital of the prisoners of war. Daily inspections were enjoined, and weekly reports required, covering such points as personal cleanliness, clothing and bedding, quarters, kitchen and messing, police, sinks and drainage, hospital wards and utensils, etc.

From a perusal of these reports, now on file in the office of the Adjutant General of the Army, it is evident that few prison-camps were in better condition than this depot at Point Lookout. During the warm months the prisoners were required to bathe and change their underclothing once a week. In fact, many took a frequent advantage

of the general permission to bathe in the waters of Chesapeake Bay. During the winter the facilities for personal cleanliness were not so satisfactory. The water-supply from wells, twelve to twenty feet deep, was at first sufficient for all the needs of the camp; but as fresh commitments were made new wells had to be dug, and on a few occasions of large and unexpected increments of the population, as for instance, on April 16, 1865, when over 5,000 were received, precautions had to be taken against waste of water until new sources of supply became available.

Besides the ordinary body-clothing, every prisoner was furnished with an overcoat and blanket and a change of underclothing. On each of the weekly reports are noted the number of prisoners received and the articles of clothing, etc., issued. Sometimes, when a large commitment was made, the clothing on hand was insufficient for the supply of the new arrivals. Thus, although during the week ending October 16, 1864, 1,000 overcoats, 1,800 blankets, 402 blouses, 202 pairs of drawers, 168 pants, 650 shirts, 650 pairs of shoes and 380 pairs of socks were issued, it is stated that to make the prisoners comfortable and provide each with a blanket, further issues of 4,000 shirts, 3,000 pants, 2,500 pairs of shoes and 1,500 blankets were imperatively required. Requisitions for needful articles were as a rule promptly honored. The quartermaster had on hand at this time a large number of pants, but as they were of the regulation blue color it was deemed inadvisable to distribute them. The similarity in the dress of the guard and prisoners would have facilitated escape, particularly as over 900 of the prisoners were daily employed on the public works outside the stockade. During the winter some of the prisoners received extra articles of clothing from their friends in the south, and on February 19, 1864, twelve bales of blankets and one case of socks arrived from New York through the Confederate Agency for the supply of prisoners. These, and subsequent supplies from the same source, were distributed by a committee of prisoners to whom this duty was assigned. The report of March 5 states that two other lots of clothing had been received from General BEALE, the rebel agent in New York, and that of March 26 has the further statement that "the supplies of clothing furnished by the Rebel authorities are quite liberal and timely."

The quarters consisted of Sibley tents, twelve men to a tent, and A tents with four men in each. No description is given of the character of the make-shift shelters constructed of cracker-boxes and fragments of old lumber, but as permission to build was regarded as a favor, it seems as if these compared favorably in point of comfort with the tents, one-third of which, towards the end of the occupation of the camp, were reported as unserviceable.

Six kitchens, with large mess-halls attached, were used in the preparation and consumption of food. The rations were uniformly of good quality and well cooked. At the time these inspections were instituted vegetables were issued freely to counteract the tendency to scorbutic manifestations among the prisoners, and these issues appear to have been kept up to the end.

The camp was preserved in an excellent state of police. All cleaning was completed before 9 A. M., at which time the prisoners formed line in their respective divisions and were inspected by the provost marshal. To supplement the sinks, boxes were in use for the convenience of the prisoners during the night. These were removed in the early morning by the police parties.

At the suggestion of Surgeon THOMPSON nine hospital wards of sixty beds each were built outside the stockade; they were reported finished on October 30. There were in addition one hundred and twenty hospital tents floored with lumber and fitted up with hospital beds. Wards were set apart for the treatment of measles, small-pox and erysipelas. These, with a full staff of medical officers and attendants and ample supplies of medicines and medical comforts, were provided for the cure of the prisoners when sick and as a relief to the wards of the Hammond Hospital, which, however, continued to keep its doors open for the reception of prisoners when, as was usually the case, the prison-hospital failed to accommodate their number. On December 18 Surgeon THOMPSON insisted on the necessity for increased hospital facilities, but no action was taken on this recommendation as the Hammond Hospital at all times acted the part of a prison-hospital.

Occasional remarks on the reports of the provost marshal by Brigadier General JAMES BURNES, commanding the prison-camp, testify to the existence of a uniformly satisfactory condition of affairs. "I have," he says on the report of November 6, "nothing particular to add to the statement of the inspecting officer except my general testimony to the kindness manifested by the different officers connected with the duties of the government and discipline of the camp. Fortunately the general good conduct of the prisoners renders unnecessary any act of severity towards them, and is at the same time sufficient testimony as to the mode of their treatment."

The following extract from a report of Assistant Surgeon J. C. MCKEE, U. S. Army, dated July 1, 1862, shows the insanitary conditions at one of the minor or temporary prison-camps—that established near Springfield, Illinois:

"CAMP BUTLER, ILLINOIS, is situated on the Great Western Railroad, six miles from the town of Springfield. The camp is established on a rather high and rolling piece of ground, surrounded by a high board fence, enclosing some fifteen acres of land. It was originally intended as a camp of instruction for volunteers. The barracks were built for two regiments. They are mere shells, single boards forming the sides and roofs; the sides very low, about eight feet in height; the roofs covered with tarred paper. Erected by contract they afford protection neither from storms nor heat. During this month the thermometer has been steady at 102° for days in my own room. The effect of such intense and continued heat on the sick and well in these miserably constructed barracks has been prostrating in the extreme. The prisoners of war, over two thousand in number, occupy the rows of barracks on the right; in front of these there are two rows of tents on a main street also occupied by them. Four of the barracks in this row are used as hospitals, part of another as a drug store. A line of sentinels surrounds all, leaving ample room for the prisoners to exercise; but they are generally indifferent to this and to their personal cleanliness. Two other hospitals outside of these lines are now allotted to convalescents on account of the shade. On my arrival here in May I found the hospitals, six in number, in a miserable sanitary condition. No one had taken the authority or trouble to better this. The floors were filthy; deodorizing agents were not thought of; slops and

filth were thrown indiscriminately around. The sick were crowded in wooden bunks; some on the floor, many without blankets, and nearly all without straw, either new or old. No attention was paid to ventilation or drainage. The stench of the wards was horrid and sickening. Food was abundant but badly prepared; medicines were deficient. The stewards were ignorant and negligent of their business; the nurses and cooks insubordinate and inattentive to the wants of their sick companions. The condition of the prisoners, many of whom had been broken down in service prior to their capture, opened a favorable and unlimited field for the development of low types of disease, and accordingly typhus and typhoid fevers, pneumonia, erysipelas, etc., raged with violence and great fatality.

To carry out my plans of improvement required much explanation and persuasion. I was successful in what I undertook for the comfort of these unfortunate sick. Floors were scrubbed; lime applied freely on the walls and floors; ventilation and drainage attended to. A fever hospital (making seven) was established; another hospital was used for pneumonia; another for erysipelas. The surgeons (prisoners of war) were assigned to their own hospitals; stewards and nurses were encouraged to emulate each other in the cleanliness of their wards—all with the happiest effects. Cooks were supplied with necessary kitchen furniture; barrels were procured for slops; water was furnished in abundance for the sick; wards were limited to the number of 30 patients. The hospital fund procured many necessary articles such as ice. The Medical Purveyor at Chicago sent me a full supply, according to the Standard Supply Table, for six months. A drug store, under an excellent druggist, was established. A quantity, sufficient for a change, of shirts, drawers and sheets was obtained from the Quartermaster; fresh straw and bed-sacks were also secured. Under these changes the difference in the mortality of my hospitals was remarkable and exceedingly gratifying. During the month of May one hundred and twenty-three died, whilst in June only thirty died.

Of twenty-four cases of camp fevers (typhus) four died; of fourteen cases of typhoid two died; of thirty-three cases of common continued fever two died. In two cases I was unable to diagnose whether they were typhus or typhoid until after a *post-mortem* examination. The former disease was sudden in its attacks; in two cases the patients died on the third day. Ammonia, tonics and stimulants had to be used in large quantities. One case (I thought of fatal relapse) was saved by blistering the whole length of the spine with ammonia and mustard. Typhoid or enteric fever was treated much in the same way, with the addition of oil of turpentine, of which I cannot speak too highly. Quinia had to be employed freely among these men in nearly all diseases. They generally come from miasmatic districts. I can speak with the highest satisfaction of the use of muriated tincture of iron in the treatment of erysipelas; alternated with quinia it controlled the disease in all its forms. I found local applications, as of iodine and nitrate of silver, unsatisfactory in their results, not controlling the spread of the disease. I abandoned their use and applied emulsion of flaxseed, saving pain and trouble to my patients. The two fatal cases reported were complicated with other diseases."

Having obtained from this investigation of the reports of the medical inspectors some idea of the unhygienic surroundings of the prisoners at these depôts, the following table, contrasting their mortality-rates from all diseases and from certain prominent classes of disease, may be consulted with advantage:

TABLE XXI.

Comparing the Annual Sickness and Mortality from certain Specified Diseases at the Principal Depôts for Rebel prisoners.

NAME OF PRISON.	Camp Douglas, Ill.	Alton, Ill.	Rock Island, Ill.	Camp Morton, Ind.	Johnson's Island, Ohio.	Camp Chase, Ohio.	Elmira, New York.	Fort Delaware, Del.	Point Lookout, Md.	All these depôts.
Annual sick-rate per 1,000 strength ...	3,757	10,072	1,575	1,485	811	4,735	1,544	3,549	2,471	2,997.6
Annual death-rate from—										
Continued Fevers	19.2	24.5	6.4	7.0	5.9	10.4	21.2	12.7	12.3	13.6
Malarial Fevers	12.7	62.0	6.1	19.9	2.3	6.7	9.9	14.2	9.2	12.6
Eruptive Fevers	36.7	188.0	51.0	14.3	3.8	71.6	58.9	38.5	18.9	42.3
Diarrhœa and Dysentery	38.1	80.2	42.5	52.8	10.5	44.6	211.5	52.4	116.3	73.0
Scurvy	2.1	2.1	1.6	1.0	0.0	1.0	3.0	7.7	9.5	4.3
Pneumonia and Pleurisy	70.7	96.6	46.4	82.5	5.7	188.6	117.3	32.7	23.7	61.7
All diseases	214.5	509.4	186.1	196.8	35.4	343.2	444.1	179.1	206.6	230.4
Percentage of fatal cases	5.7	5.0	11.8	13.2	4.4	7.2	28.8	5.0	8.4	7.7
Annual death-rate from disease per 1,000 men admitted.	44.1	55.0	98.0	46.7	9.8	75.2	241.0	45.4	46.4	65.7

The average death-rate from disease, 230.4 annually per thousand prisoners present, was exceeded at the three depots, Alton, Ill., Elmira, N. Y., and Camp Chase, Ohio. At the first named of these prisons the high rate of 509.4 annually per thousand, calls for special inquiry into the conditions that produced it. Excepting scurvy, every one of the diseases mentioned in the above table had at this post a death-rate higher than among the prisoners generally. The exception suggests that here the inmates had a better and more varied diet than was served at prisons where the death-rate from disease was below the average, as at Fort Delaware and Point Lookout; the diet, at least, was apparently not responsible for the great mortality. This large death-rate seems at first sight an argument against the use of permanent brick or stone buildings, like this convict prison, as depots for the safe-keeping of prisoners of war. The annual rate from the eruptive fevers, 188, as against 42.3, the average among the prisoners in all the depots, might be held as illustrating the ravages of small-pox when such close ill-ventilated buildings become infected. The death-rate for the continued fevers, 24.5, nearly double that of the same fevers among the prisoners as a whole, might be regarded as further testimony to the influence of crowd-poisoning within substantial walls as compared with the influences developed by similar crowding in tents and cheaply constructed wooden pavilions. But when it is observed that malarial fevers also were largely more fatal than at any of the other depots, although the penitentiary was on a high, dry and well-drained site, it must be concluded that the facts, so far as presented, do not include everything bearing upon the mortality-rate per thousand of strength at this post.

The vast number of cases, 10,072, taken sick annually at Alton in an average strength of 1,008 men, equivalent to ten entries on sick report per man during the year, also requires explanation. This is found in the fact that the strength present was not a settled population; it consisted of constantly varying elements. Detachments of prisoners were received, bringing with them their sick to augment the sick report, while generally only the well men, those fit to travel, were exchanged, released on oath or enlisted into the service, the sick remaining to swell the mortality lists of the post. The number of persons committed to this depot was 9,330, and as the average strength was only 1,008, the stay of each prisoner must have been of comparatively short duration. Practically the strength present was changed 9.2 times during the period of its occupation as a military prison, or 3.2 times annually. When the deaths are viewed in connection with these facts, Alton will be found to have been by no means the terrible pest-hole suggested by the enormous rate of its cases to the average of its strength, or by the annual demise of more than one-half of its population.

All the other depots except Fort Delaware and Johnson's Island had a larger percentage of fatal cases of disease than the Alton penitentiary. The Fort Delaware rate of 5.0 per cent. equalled that of Alton; only at Johnson's Island was the rate of fatality smaller, 4.4 per cent. The ratio of deaths to cases among prisoners is, however, not of much value, as uncertain numbers of slight cases were not taken upon the report. But when the deaths are considered in relation to the number of persons who entered the penitentiary, the annual rate of 55.0 per thousand will be found less than the average rate of all the prisons, 65.7 per thousand.

Alton may not, therefore, be considered as having been the worst specimen of our northern prisons. On the contrary, but for the heavy mortality of its small-pox epidemic, it would have compared favorably with any of the others except the depot at Johnson's Island, Ohio.

Similar changes, to some extent, took place at all the other prisons, and their influence must be considered in estimating the unhealthiness of these depots from the death-rates expressed as ratios of the average strength present. A statistical table contained in a report of the Adjutant General of the Army appended to the Report of the Committee on the Treatment of Prisoners of War, gives the total number of commitments to each of the prison depots: Camp Douglas, Ill., received 26,060 men; Alton, Ill., as already stated, 9,330; Rock Island, Ill., 11,458; Camp Morton, Ind., 12,082; Johnson's Island, Ohio, 7,027; Camp Chase, Ohio, 14,237; Elmira, N. Y., 12,147; Fort Delaware, Del., 25,275; and Point Lookout, Md., 42,762.*

When the deaths are calculated as annual ratios per thousand of these commitments, the depot at Elmira, N. Y., and not that at Alton, Ill., stands forth as the most insalubrious of these prison-camps. Not only had it a high mortality-rate, 144.1 annually per thousand of strength, but the percentage of fatal cases, 28.8, was more than double that of any other depot. The latter rate, like the corresponding figures from the Andersonville prison, gives no true expression to the ratio of deaths to cases, but it indicates such an extensive prevalence of disease that only the serious cases too often destined to be fatal, were taken up on the registers of sick. The death-rate was equally high when viewed in relation to the commitments, 241.0 annually per thousand, as compared with 35.0 at Alton, or 65.7, the average of the prison-camps. Diarrhœa and dysentery, which caused more deaths at this depot, in proportion to the strength present, than were occasioned by all diseases at some of the other camps, and pneumonia which produced a rate nearly double that of the average of the prisons, were the diseases which gave Elmira its unenviable notoriety. From the reports of the medical inspectors it is evident that while a large mortality was undoubtedly referable to over-crowding, insufficient hospital accommodation and insufficient protection from the cold of a northern climate in the earlier history of the depot, the main influence underlying all these and raising them into strong relief, was the broken-down condition of the men at the time of their commitment: most of them suffered from diarrhœa of a chronic character. Of the 1,304 deaths attributed to diarrhœa and dysentery on the records of this camp, 1,276 were reported as from chronic diarrhœa and only 6 from acute diarrhœa, 7 for acute dysentery and 5 for chronic dysentery.

Turning from the high rates prevalent at Elmira, it is a pleasure to point out the 35.4 per thousand of strength which constituted the annual mortality-rate at Johnson's Island, Ohio, its fatality rate of 4.4 per cent. of the cases and its 9.8 deaths annually for every thousand commitments.

The absence of Confederate records showing the general condition of the men on active service deprives us of the ability of knowing from that source their probable state of health at the time of their capture. The few statistics presented in Table XIV indicate that the Confederate sick-rate was considerably greater than that of the Union forces, and that diarrhœa, dysentery and pulmonary affections, exceedingly prevalent in both armies, were more prevalent among the southern troops. In Table XIII these diseases were observed to yield at the same time a much larger percentage of fatal cases in the rebel ranks, the deaths from pulmonary disease constituting as much as 18.82 per cent. of the cases as compared with the federal rate of 2.54 per cent. The unlimited corn-meal, which formed the farinaceous staple of the Confederate ration, was certainly a prolific cause of intestinal

irritation, especially in troops subject to the influence of strong predisposing conditions. The high rates in pulmonary affections may readily be referred to the exposures of the poorly clad and imperfectly protected southern soldiers during service in a northern and less genial climate than that to which they were accustomed. No information is on file concerning the prevalence of scurvy in their ranks; but that it was present to a greater extent than among the federal troops may be taken for granted, in view of the liberal ration of the latter, the efficiency of their supply system and their greater facilities for purchasing by private funds. It seems, indeed, highly probable that much of the scurvy reported on the sick lists of the prison-camps affected the prisoners at the time of their capture. At Johnson's Island, Ohio, where no death from scurvy took place, and where the abundance and variety of the diet negatived the idea of its development in the prison, there were, nevertheless, fifty-eight cases reported among the inmates, most of whom were officers of the rebel army. These cases must have reached the island in the scorbutic condition which necessitated their appearance on the sick list. And if scurvy affected the officers, its presence to a greater extent among the men cannot be doubted.* To the better condition of the officers of the Southern army, as compared with that of their men when the fortune of war consigned them to Johnson's Island, Ohio, must be in great part attributed the slight amount of sickness and mortality that affected them during their detention. They were subject to the same rules and regulations, and had the same ration as the prisoners in other camps. They had 300 feet of air-space in quarters, a more liberal allowance than was commonly furnished; but, as will be seen directly, the mortality among the prisoners generally cannot be ascribed to the limitation of bed-space.

The presumption is that, at the time of their capture, many of the prisoners were suffering from diseases resulting from insufficient diet and from the exposures and continued fatigues incident to the military movements preceding the disaster that brought about their captivity.

But no doubt exists as to their condition on their arrival at the prison. This is recorded by many of the inspecting officers. In fact, "the debilitated condition of the men from previous hardships and exposures," or words of similar tenor are of frequent occurrence in all reports relating to the sickness and mortality of the prisoners, as in those from Elmira already noted. To this is sometimes added a reference to the depressed mental condition consequent on their status as prisoners of war. Dr. ALDEN states very decidedly that the mortality from diarrhœa and dysentery among the prisoners at Fort Delaware in July, 1863, was almost entirely confined to the men from Alabama, Mississippi and other southern states taken by General GRANT's army around Vicksburg. Most of these men arrived in a broken-down condition, emaciated, and already the subjects of the disease for some weeks or months, while at that time the prisoners from General LEE's army, also confined at Fort Delaware, were in good condition. Dr. ALDEN's inference that the influences to which the prisoners were subjected at Fort Delaware were not to be charged with the sickness and mortality then occurring among them seems thoroughly sustained.

The following extract from a report on the sanitary condition of the depot at Hart's Island, New York Harbor, dated June 21, 1865, by GEORGE H. LYMAN, Medical Inspector,

* Dr. JONES says: "The large armies of the Confederacy suffered more than once from scurvy; and as the war progressed, secondary hæmorrhage and hospital gangrene increased to a great extent from the deteriorated condition of the blood, dependent on the prolonged use of salt meat; and but for the extra supplies received from home, and from the various benevolent State institutions, scurvy, diarrhœa and dysentery would have committed still greater ravages."—*U. S. San. Com. Memoirs*, p. 481.

U. S. Army, is submitted as a special illustration of the point in question, while showing at the same time that the insanitary influences affecting the prisoners at the smaller depots were similar in character to those already described as characteristic of the larger prison-camps:

The chief cause of the mortality is to be found in the fact that large numbers of the prisoners arrived at the depot broken down, in advanced stages of disease, some in fact moribund, and others past all hope for treatment.

The New Berne detachment, captured chiefly in the Carolinas, were nearly all broken down on arrival. It is said that less than 100 of them could be considered as well men or even in fair health. The surgeon then in attendance having been relieved, more precise information on this point is not now available; but it is certain that the largest percentage of sickness and mortality occurred in that detachment.

The largest proportion of deaths occurred from chronic diarrhœa brought with them, and pneumonia, which began to appear a few days after their arrival. The men being poorly clad, the weather wet and cold, and the barracks provided with no other bedding than such as the prisoners brought with them, the pneumonic cases developed rapidly, and the reduced vitality of the patients favored a typhoid type of that disease, increased probably to some extent by the crowded and unventilated condition of the barracks. These appear by measurement to have afforded 102 cubic feet of air-space to each man, and with no other ventilation than that afforded by the doors and windows on one side. Quite recently openings for ventilation have been made upon the other side of the barracks, it constituting the outer wall of the prison enclosure.

The rations have been good and in the quantity ordered by the Commissary General of Prisoners, which is sufficiently liberal. The hospital ration has been such as is used in our own hospitals.

The drainage from the barracks is superficial but good. The sinks are outside the camp and over tide-water. The water for cooking and drinking is abundant and of excellent quality; it is derived from wells.

The prisoners have had access, under guard, to the beach, and have availed themselves of it freely for salt-water bathing. They have also been *required* to take daily exercise.

Over-crowding was regarded by the inspectors as the most serious of the insanitary conditions bearing on the prisoners during the period of their detention. But this comprehended more than the mere limitation to so much dormitory space. Under it were gathered all the evil consequences of suddenly assigning a large number of men to a camp which had not been systematically arranged for their reception. The prisoners were generally destitute of clothing and blankets, and one-tenth of them on arrival required hospital treatment. The exposures consequent on their destitute condition speedily increased the disparity between the hospital accommodations and the requirements of the sick. The wards became crowded, and the more recently developed cases had to remain in the still more crowded general quarters of the prisoners, lacking the comforts which the hospital provided for its less unfortunate inmates, and adding grievously to the harmful influences of the quarters containing them. Generally, also, healthful exercise was prevented by the mud and dust begotten of the surface-soil by the tramping of many feet in the ordinary occupations of prison life. Defective police and inadequate arrangements for the disposition of excreta rendered the external air in many places foul and sickening. A hastily dug series of pits often emitted their polluted exhalations in close proximity to the quarters, because if placed at a greater distance the sick men, especially at night, would fail to reach them. The prisoners had foul air without and fouler air within their quarters. Under these circumstances the extension and aggravation of diarrhœal cases, and the typhoid type assumed by febrile diseases such as pneumonia, naturally followed. The evils directly referable to the commitment of an excess of depressed, debilitated and destitute men to a given camp were the causes of the large sick and mortality rates that prevailed. Over-crowding, as restricted to a limitation of bed-space, was a concomitant but minor evil, as it alone would have required some time to produce its typhous effects.

Without exception, the officers in charge of these camps and hospitals, and the medical inspectors in their monthly rounds, recognized the conditions in fault; and their earnest efforts at improvement are worthy of all commendation, since they saved many lives to our re-united country and preserved our annals stainless.

The history of each of these camps shows at first a period of overwork, anxiety and grave responsibility on the part of the officers in charge when their failure to provide for the urgent necessities of the occasion would have been attended with disastrous results. In no instance does it appear that the food-supply was at any time deficient; but clothing, bedding, shelter and kitchen utensils for those who were well, and hospital accommodation, supplies and comforts for those who were sick, had often to be provided at short notice and under various difficulties. Hospital clothing was issued to the destitute until the arrival of authorized supplies. Tents were obtained for use until barracks were built. Barracks were used as hospitals until special buildings were erected. Sinks were dug for the excreta until some less objectionable method of disposal was planned and carried into effect. Trenches were opened for drainage until a covered system was provided. Nor did the improvements end when all were sheltered and fitted out with comparative comfort. New barrack buildings were constructed after improved plans, and the old were destroyed or retained to increase the available air-space. New hospitals with better conveniences replaced the old, which became converted into increased barrack-room. Lavatories and baths and the accessibility and abundance of the water-supply for flushing and other purposes received attention. In fact, from the establishment of the prison-camp until its disuse at the close of the war, the improvement of its sanitary condition was progressive and uninterrupted.

The sites selected were usually such as were considered healthy; that at Elmira had been used from the beginning of the war as a recruiting depot, and the twenty barrack buildings formerly occupied by the recruits formed the nucleus of the prison-camp,—nor was this a solitary instance of the kind. The bed-space allotted to each man in quarters was sometimes less than one hundred cubic feet, as at Fort Delaware where three tiers of bunks ran along each wall of the pavilion separated by a central or median aisle. Over-crowding to this extent was, however, not confined to the prison-barrack buildings. The wooden shelters built for the Union regiments at depots which were considered permanent were fitted up with similar shelves. The experiences of the war educated our people in sanitary matters. At an early period of its progress medical inspectors urged, with some hope of success, a reduction of the bunks to two tiers in the prisoners' quarters as well as in those of our own troops. Their request must not be esteemed a measure of what these officers considered needful. They did not ask for all they wanted, but only for what they might be likely to get.*

That the mortality among the Confederate prisoners was due, as suggested above, to other causes than the mere limitation of barrack-space, is shown conclusively by some of the reports. In the summary of the sanitary history of Camp Chase a tabular statement is given of the occupancy of the barrack buildings by the Confederate prisoners and their Union guard, showing that the latter had an air-space of 150 to 210 feet and an area of 12 to 15 feet per man, while the former had 137 cubic feet and 11.4 of superficies. There occurred in January, 1865, while the buildings were thus occupied, 8 deaths among 1,683 Union troops, or 1 in 210, and 283 deaths among 7,583 prisoners, or 1 in 26.79; in the following month the deaths among 6,414 Union soldiers numbered 36, or 1 in 178, while of 8,259 prisoners 495 died, or 1 in 16.68. These enormous differences in the death-rates cannot be attributed to the comparatively trivial differences in the air-space.

* The double-tiered bunk was not finally expelled from its last retreat in a western military post until ten years after the war.

Small-pox followed diarrhœa, dysentery and pneumonia in order of importance as a cause of death among the prisoners, having occasioned 32.1* of the 230.4 deaths that occurred annually from disease in every thousand of the average strength present. Nothing is on record concerning the prevalence of this disease in the southern armies. Table XIII shows that among the unknown number of the Confederate forces there were up to December, 1862, 44,438 cases and 2,274 deaths from the eruptive fevers, as compared with lower figures among the certainly larger number of the Union troops. But these statistics include measles, etc., as well as small-pox. Nevertheless its frequent occurrence among them may be inferred in view of the fact demonstrated by its ravages in the prisons,—the insufficiency of their protection by vaccination. Certainly in some instances it was apparently introduced into the prisons from the Confederate ranks. The eruption is reported as having broken out on some of the prisoners within a day or two after their arrival at the depot.

Our medical officers appear to have fought the contagion with small success, sometimes with difficulty, as at Rock Island, and protecting by vaccination, also with difficulty sometimes, as at Camp Douglas and Alton, until the scourge was controlled. In reporting the condition of Camp Douglas in June, 1864, Dr. HUMPHREYS says:

> Of those prisoners who have been vaccinated in prison with virus that produced normal effects in United States troops, 668 have healed readily, while 262 vaccinated are suffering from progressive or ulcerated or gangrenous sores. This difference in the results from the use of the same virus in federals and rebels must be attributed to the cachectic and scorbutic condition of the latter.

In a report for January, 1863, Dr. WALL, the surgeon in charge at Alton, remarks as follows:

> Epidemics both of small-pox and erysipelas visited us, the former with fearful violence; and what rendered it very unfortunate for us, the vaccine virus that we obtained from St. Louis, Mo., proved worthless,—thus rendering abortive for a while our attempts to stay its progress by vaccination. I am confident that if we had been successful in procuring good virus we would have modified the epidemic to a very great extent.

The probability of a marked scorbutic taint in the southern troops has already been suggested as accounting for much of the sickness and mortality directly charged against scurvy by the prison records. The ration furnished by the Government in the prosecution of war was more liberal in its quantity and variety than that issued by the Confederate Government to its soldiers on active service. Other things being equal, scurvy was therefore more likely to affect them before than after their capture.

The United States ration, in accordance with Army Regulations, consisted of:

> Three-fourths of 1 pound of pork or bacon, or one and one-fourth pounds of fresh or salt beef; eighteen ounces of bread or flour, or twelve ounces of hard bread, or one and one-fourth pounds of corn-meal; and to the daily issue one hundred rations, of eight quarts of peas or beans, or in lieu thereof ten pounds of rice or ten pounds of hominy, twelve pounds of sugar, four quarts of vinegar, one and one-half pounds tallow, or one and one-half pounds of pure adamantine, or one pound of spermaceti candles; four pounds of soap, and two pounds of salt. When troops are on marches [illegible] on board transports, the ration of hard bread is one pound. [illegible] When the officers of the medical department shall consider anti-scorbutics necessary for the health of the troops the commanding officer may direct issues of fresh vegetables, pickled onions, sour-krout, or molasses, with an extra quantity of pork and vinegar. [illegible] Potatoes are usually issued at the rate of one pound per ration, and issues of the part of some months in lieu of part of beans. [illegible] Issues (extra) of molasses are [illegible]—two quarts to one hundred rations—and of dried apples or peaches one and one-half bushels to one hundred rations.

During the early period of the war, when the full ration was issued, scurvy was comparatively rare. At later dates the supply department became unable to furnish sufficient corn-meal had to be largely substituted for it, and [illegible] beef was [illegible]

larly supplied, and the issues of rice, beans, molasses, vinegar, potatoes, dried apples and vegetables generally were diminished in frequency and in quantity. Scurvy appeared in consequence, manifested, according to Dr. JONES:

> In the frequency of night-blindness, in the numerous accidents after vaccination, in the increase of secondary hæmorrhage and hospital gangrene after wounds, as well as in the actual manifestations of the disease, indisposition to exertion, spongy gums, uncertain and ill-defined muscular pains, and obstinate diarrhœa and dysentery.*

The Subsistence Department of the United States Army allowed the same money value for the subsistence of the Confederate prisoner of war as for the Federal soldier. In other words, the ration allowed to the prisoner was the same in all its parts as that allowed to the United States volunteer. But the experience of our army had demonstrated that the troops seldom consumed the whole of their ration. Arrangements were therefore made by which the money value of the unconsumed portion accumulated in the hands of the subsistence officers, forming a fund by which the diet of the men might be varied by the purchase of articles not kept for issue by the subsistence department as a formal part of the ration. A surplus of bacon or coffee could by this means become converted into fresh vegetables if needful for the health of the command. Cooking utensils and articles of mess-furniture for the comfort and convenience of the men were also authorized to be purchased with this fund. A similar system was adopted at the hospitals, and milk, eggs, chickens, oysters, fruit, vegetables or other articles not issued by the subsistence or medical departments of the army, and needful for the use of the sick, were obtained by means of the money value of the bacon, flour, coffee or other articles of issue which they did not consume.

This system, in use in the forts and garrisons of the United States, was extended to the prison-camps and their hospitals. The Commissary General of Prisoners published from time to time the articles and quantities to be issued for consumption by the prisoners, and the difference between the money value of the ration thus issued and that of the full ration allowed by law to the United States soldier was set aside as a prison fund for the purchase of such articles as were necessary for the health and comfort of the prisoners, and not expressly provided for by the Army Regulations.

The saving on the ration was the chief but not the only source of the prison fund. The sutler or camp-trader was taxed a small amount for his privilege of trade, and this tax made a part of the general fund, as did also all current money left by deceased prisoners of war or accruing from the sale of their effects, and all current money clandestinely forwarded to prisoners or found concealed by them.

The following table shows the ration in kind allowed to the prisoners by circulars of the dates mentioned from the office of the Commissary General of Prisoners, together with the full ration of the United States troops at the same dates, and the difference in the value of the two rations credited to the prison fund. Prior to April 20, 1864, no specific instructions were published limiting the quantities of the constituents of the ration to be issued, but commanding officers of prison-camps were directed to withhold from the ration all that could be spared without inconvenience to the prisoners, as a basis of a fund for their benefit. After the establishment of a special prison-issue, commanding officers were authorized to report to the Commissary General of Prisoners, if at any time it seemed advisable to them to make any change in the scale:

* *Mem. U. S. Sanitary Commission*, p. 624.

	Prisoners of War.			U. S. Troops, 1864.	Prisoners of War.		U. S. Troops, 1865.
	April 20, 1864.	June 1, 1864.	Employed on public works, June 13, 1864.†		January 13, 1865.	Employed on public works.	
Pork or bacon, or	10 oz.	10 oz.	12 oz.	12 oz.	10 oz.	12 oz.	12 oz.
Fresh or salt beef	14 oz.	14 oz.	16 oz.	20 oz.	14 oz.	16 oz.	20 oz.
Flour or bread (soft), or	18 oz.	16 oz.	18 oz.	22 oz.	16 oz.	18 oz.	18 oz.
Hard bread, and	14 oz.	14 oz.	16 oz.	16 oz.	10 oz.	12 oz.	12 oz.
Corn meal	18 oz.	16 oz.	18 oz.	20 oz.	16 oz.	18 oz.	20 oz.
To each 100 rations:—							
Beans or peas, and	6 qts.	12½ lbs.	14 lbs.	8 qts. (15 lbs.)	12½ lbs.	15 lbs.	15 lbs.
Rice or hominy	8 lbs.	8 lbs.	10 lbs.	10 lbs.	8 lbs.	10 lbs.	10 lbs.
Coffee, green, or	7 lbs.	....(*)	7 lbs.	10 lbs.	.....(*)	7 lbs.	10 lbs.
Coffee, roasted and ground, or	5 lbs.	....(*)	5 lbs.	8 lbs.	.....(*)	5 lbs.	8 lbs.
Tea	18 oz.	....(*)	16 oz.	1½ lbs.	.....(*)	1 lb.	1½ lbs.
Sugar	14 lbs.	.....(*)	12 lbs.	15 lbs.	.....(*)	12 lbs.	15 lbs.
Vinegar	.....	3 qts.	3 qts.	4 qts.	2 qts.	3 qts.	4 qts.
Candles, adamantine	3 candles.	.....	.....	1½ lbs.	.....	.....	1½ lbs.
Soap	4 lbs.	4 lbs.	4 lbs.	4 lbs.	2 lbs.	4 lbs.	4 lbs.
Salt	2 qts.	3¾ lbs.	3¾ lbs.	3¾ lbs.	2 lbs.	3¾ lbs.	3¾ lbs.
Molasses	1 qt.	.....	1 qt.	1 gall.	.....	.....	.....
Potatoes (fresh)	30 lbs.	15 lbs.	30 lbs.	100 lbs. three times a week.	.....	.....	.....
Pepper	.....	.....	.....	.....	.....	.....	4 oz.
Average cost price.....cts.	16.48	13.63	20.31	26.24	16.81	24.20	27.73
Credit per ration to prison fund.....cts.	9.76	12.61	5.93	.....	10.92	3.53	.....

* Sugar and coffee or tea were issued to the sick and wounded only, every other day, on the recommendation of the surgeon in charge, at the rate of twelve pounds of sugar, five pounds of ground or seven pounds of green coffee or one pound of tea, to every hundred rations.

† Prisoners employed on public works other than the proper police duties of their camps were allowed, if mechanics, ten cents per day, and if laborers five cents per day, from the prison fund, which allowance was authorized to be paid in tobacco to those who preferred its expenditure in that way.

Disbursements charged against the prison fund were made by the Commissary of Subsistence on the order of the commanding officer, and all such expenditures of funds were accounted for by the commissary on his monthly statement of the prison fund, showing the issues made and the articles and quantities purchased, the prices paid, the services rendered, etc. Among the articles authorized to be purchased by this fund were all table furniture and cooking utensils, articles for policing purposes, bed-ticks and straw, and the means of improving or enlarging the barrack accommodations. Extra pay was allowed from it to clerks who had charge of the camp post office, who kept the accounts of moneys deposited by the prisoners with the commanding officer or who were otherwise engaged in labors connected with the prisoners.

The hospital fund accumulated from the savings of the ration of the sick men was disbursed on the recommendation or requisition of the surgeon in charge, approved by the commanding officer. It was kept separate from the fund of the hospital for the troops. Disbursements from it were chiefly for the purchase of articles of diet, but when the fund was sufficiently large, it was permitted to be expended for shirts and drawers for the sick, the expense of washing clothes, articles for policing purposes and all articles and objects indispensably necessary to promote the sanitary condition of the hospital.

Clothing was not charged against the prison fund. The commanding officer, through his quartermaster, made requisition on the nearest depôt for such clothing as was absolutely necessary for the prisoners, and the papers were submitted for the approval of the Commissary General of Prisoners. The articles when furnished were issued by the quartermaster under the supervision of an officer detailed for the purpose, whose certificate that the issue had been made in his presence was the quartermaster's voucher for the clothing issued. From April 30 to October 1 neither drawers nor socks were allowed except to the sick. When army clothing was issued the buttons and trimmings were removed and the skirts cut short to prevent those wearing such articles from being mistaken for United States soldiers.

The efficiency of the ration allowed the prisoners of war depended, as in the case of United States troops, on the method of its management, and on the market price of vegetables in the neighborhood of the camp. The portions of the ration issued were certainly

insufficient to prevent the appearance of scurvy, for that disease was manifested among our own troops on the full ration during the war, and has been observed since the war at western posts where vegetables were scarce and correspondingly high-priced. Assuming the ration as issued to have contained a sufficiency of the nutritive elements to repair the waste generated by the internal work of the body and the slight amount of outward manifestations of force exerted by the prisoners in their enforced confinement, the want of variety in the diet would in time have produced a distaste for the food and developed the scorbutic condition. Their protection from this depended on the proper application of the prison fund. Every guard was apparently placed on the expenditure of this fund. The subsistence officers purchased only on the approval of the commanding officer, and their action was reported in detail at monthly intervals to superior authority. Inspecting officers usually devoted particular attention to the condition of the prison and hospital funds and the details of their expenditure. In many of the reports the extra articles of diet purchased during the month are itemized; in others, when a scorbutic tendency was detected, larger purchases of such articles were recommended. Generally, however, the issued rations supplemented by the purchases were considered by these able and impartial officers as an ample provision against the scorbutic taint. It may therefore be concluded that had the prisoners been healthy on their arrival, instead of broken down physically by previous hardships and depressed mentally by present conditions and anxieties, their sick and mortality lists would have been no more burdened with scorbutic cases than were those of our own men who underwent the strain of active service upon the same allowances.

In summing up the results of this study of the inspection reports of the prison depots, it may be said that the hardships and exposures entailed on the men by the military events that ended in their capture were the main causes of the disease and mortality with which they were afflicted during their subsequent confinement. The hurried marches, want of sleep, deficient rations and exposures in all kinds of weather, by night and by day, that precede and attend the hostile meeting of armies result in larger losses by disease than those that are directly attributed to the engagement. And as the wounded of a defeated army are more exposed to capture than the uninjured, so the exhausted and debilitated rather than the vigorous become included in the lists of prisoners of war.

Fatigues and exposures en route to the prison depots supplemented those already endured in exhausting their strength and producing sickness. The prisoners seldom carried from the field a sufficiency of clothing and blankets to protect them from ordinary weather-changes, and to these the journey frequently added changes of a climatic character.

The depression of spirits consequent on defeat and capture, the home-sickness of the prisoners, the despondency caused by scenes of suffering around them, the gloomy and vacuous present, and the uncertainty of the future, conspired to render every cause of disease more potent in its action.

The sudden aggregation of these men at camps unprepared for their reception developed many insanitary conditions which combined with pre-existing causes in evolving sickness and stamping it with a greater virulence. The most prominent of these were: the temporarily defective police of the camp, which contributed to the spread of diarrhœa and dysentery; the insufficient protection in quarters, which induced inflammations of the respiratory organs and gave them a typhoid character by the over-crowding; and the insufficient hospital accommodation, which, in leaving the sick in quarters, tended to the

development of new cases, or, in taking them into hospital, lessened the chances of recovery of those already there.

But the evil influences exercised by the camp conditions would not have been followed by the same sickness and mortality had the ground and shelters been crowded to the same extent with well-disciplined troops awaiting the opening of a campaign. The broken health and broken spirits of the inmates were the main factors in the production of disease and death.

CHAPTER II.—INTRODUCTORY TO THE PRESENTATION OF THE CAMP FEVERS.

The fevers which prevailed in our armies were reported at the beginning of the war under the respective headings of *typhus*, *typhoid* and *common continued fevers*, *remittent fever* and *quotidian*, *tertian*, *quartan* and *congestive intermittent fevers*. Each of these names indicated, with more or less precision, a particular series of morbid phenomena. The aggregation of symptoms which gave the disease in each instance its individuality might be stated from an extensive personal knowledge of the clinical and pathological views held by the medical men who dealt with these febrile cases, but this would be admissible only in the absence of general and more trustworthy data. The lines defining each of these specially reported fevers might be drawn from the clinical records of the regimental and general hospitals of the time: but the presentation and study of these must be made later and in other connections. Nor is it necessary that this study should be attempted at the present time, for the clinical and other facts implied by the titular diagnoses of our medical men in 1861, in febrile cases, may be gathered from a brief reference to the important discoveries concerning the non-identity of certain fevers which had been made some years before, to the character of the fevers prevalent in this country at the outbreak of the war, and to the volumes on practice of medicine which were furnished by the Medical Department of the Army to its officers as books of reference.

Typhus and Typhoid Fevers.—Many observers from the time of Willis and Sydenham described epidemics of fever differing notably in their characteristics from those of the typhus, which, under such names as *pestilent*, *malignant*, *putrid*, *contagious*, *camp*, *ship*, *jail* and *hospital* fevers, prevailed from generation to generation as a well-known scourge. These anomalous cases were afterwards named *slow*, *mild*, *nervous fevers*, or *low continued fevers*; and their occurrence was considered due to some peculiarity of the epidemic constitution from meteorological or other alterations in the condition of the atmosphere.*

At the beginning of the present century it was stated by Prost, on the authority of autopsical observations, that these fevers had their seat in the mucous membrane of the

* Sydenham suggested this peculiarity of the epidemic constitution as arising "from some certain secret and hidden alterations taking place within the bowels of the earth and pervading the atmosphere; or that, perhaps, it might chiefly depend upon some influence of the heavenly bodies." *Sydenham Society's Syd.* London, 1850. Vol. II, p. 191.

intestine; and for some years afterward it was taught in the French schools that they were essentially an enteritis. In 1813 PETIT and SERRES showed that the lower part of the ileum was specially affected, and that the disease, thus differing in its site from an ordinary inflammation, must be of a specific character. BRETONNEAU's observations in 1818–27 localized the inflammation in the solitary and agminated glands, and demonstrated a want of correspondence between the severity of the local lesion and the gravity of the general symptoms. He regarded the disease as an internal exanthem,—*dothienenterite*.

Two years later, in 1829, the observations of LOUIS recognized the lesion of the intestinal glands as the essential or characteristic of the specific fever which he described as the *typhoid affection*. The profession in America became familiar with LOUIS' work through Dr. BOWDITCH's translation published in 1836.

Meanwhile pathologists in England failed to discover the glandular lesions in their fever cases except occasionally in such as presented some variations from the type of true typhus. BRIGHT in London, and ALISON in Edinburgh, in 1827, reported cases in which were found the intestinal lesions of the French observers. Thus, while the French pathologists considered the glandular lesions essential to typhus as it occurred under their observation, the British regarded them only as a comparatively rare and accidental complication. These opposing views were reconciled by a demonstration, made in Philadelphia, of the non-identity of the British and French fevers. At this time the continued fevers of the United States were neither so contagious nor so deadly as those of Britain. In the preface to his translation of HILDENBRAND on Contagious Typhus, published in 1828, Prof. S. D. GROSS said of our so-called typhus: "Nor is it perhaps precisely of the same nature and characterized by the same symptoms as the typhus of Europe." But Drs. GERHARD and PENNOCK of Philadelphia, who had studied the typhoid affection under LOUIS, and seen British typhus in London, recognized in the former the prevailing continued fever of their own country, and were able to identify the latter when it appeared in an epidemic form in Philadelphia during their service at the hospital Blockley. Their experience of this outbreak* established its identity with the contagious typhus of Britain, and showed the characteristics which distinguished it from the familiar typhoid or *dothienenterite*. These were the activity of its contagion, the suffusion of the eyes, the dusky-red color of the countenance, the stupor, the petechial eruption and the absence of special abdominal symptoms, together with the general progress of the individual case as manifested in the succession of the symptoms. In 1839 Dr. SHATTUCK of Boston insisted on the existence of two fevers in London similar to those described in Philadelphia by GERHARD. His paper, read before the Medical Society of Observation of Paris, was made the basis of an argument by M. VALLEIX on the error of the English in confounding their fevers, one of which was identical with the Parisian typhoid.

As a result of these investigations LOUIS, in the second edition of his work issued in 1841, recognized that the typhoid affection of Paris was a different disease from the contagious typhus of Britain; and in our country BARTLETT in 1842 and WOOD in 1847, described typhus and typhoid as distinct affections. Some opposition was raised to these new doctrines, but its influence was slight. Professor DICKSON of Charleston, S. C., in his Elements of Medicine published in 1855, adhered to the view that fever had but a single cause, and that the variations in its manifestations, which had given rise to such names as

* *American Journal Medical Sciences*, February and August, 1837.

typhus *gravior* and *mitior*, *putrid* and *nervous* fevers, *cerebral* and *abdominal typhus*, were due to variations in the intensity or concentration of the poison and to influences exerted on the condition or predisposition of the subject; as, for instance, where ochlesis gave to each of the forms the character of putridity or malignancy. He quoted approvingly from CAMPBELL * "It is undeniable that the two diseases are inseparably bound together in ties of the strongest and most indissoluble, though mysterious affinity; the necessity which any theory may involve of separating them is enough of itself to declare its absurdity." Nevertheless he was constrained to treat of typhus and typhoid in his Elements under two separate heads, in deference to the almost universal usage in America at the time.

Dr. FORREST had clearly shown, in discussing the locality of typhoid fever, that it was the common continued fever of our Eastern States, and that it occurred, although perhaps with less frequency, in the West and South, where intermittents and remittents prevailed; but most of the instances cited by him were of epidemics occurring in towns. Some years later Dr. JAS. E. REEVES brought prominently to the notice of the profession the fact that enteric fever was of common occurrence in sparsely settled rural districts as well as among urban populations.†

The works on Practice of Medicine supplied to the Medical Department of the Army in 1861 were those by WILLIAM WATSON‡ and BENNETT.§ In the first the distinction between typhus and typhoid was clearly given, and the name *enteric* fever was suggested in place of typhoid to emphasize the distinction. Dr. WATSON, influenced by Dr. JENNER's presentation of the arguments ¶ had recently subscribed to the doctrine of non-identity; and in the volume under consideration he taught the notable differences which existed in the symptoms and course of the two diseases, as well as in their comparative fatality and exciting causes, regretting that the affinity of the names imputed a similarity in the diseases and approving Dr. BUDD's suggestion to replace the name *typhoid* by *intestinal fever*. In Dr. BENNETT's lectures the views of JENNER were given, but the author did not support them. He recognized typhoid and typhus clinically, but considered them as "evidently produced by variations in the intensity or the nature of the exciting cause."

It appears evident from these considerations that our medical officers, in identifying a case of idiopathic fever as typhoid, had well-defined ideas concerning the aggregation and sequence of symptoms to which this term should be applied. Of typhus they had practically no knowledge; but they had such conceptions of this disease and of the characteristics which distinguished it from typhoid that, when a diagnosis of typhus was given, it necessarily meant that the disease differed so materially in some points from the familiar typhoid fever as to suggest that the unfamiliar typhus of Britain was under observation.

Common Continued Fever.—Many medical officers no doubt looked upon this appellative as the safe resource of a puzzling case. The studies and observations which developed a knowledge of typhoid fever as a separate disease showed so many instances of obscurely marked cases in connection with well-marked epidemics, that these lighter cases were considered due to the prevailing typhoid cause, peculiarities in its manifestations being referred to variations in the individual constitution. Thus, while separating a specific

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* [illegible] 1856, and in a *Practical Treatise on Enteric Fever*, Philadelphia, Pa., 1859.

† [illegible] *Medicine*, by GEORGE B. WOOD, M. D., Philadelphia, 1847.

‡ [illegible] *Physic*, by THOMAS WATSON, M. D., edited by D. F. CONDIE, M. D., Philadelphia, 1858.

§ [illegible] M. D., F. R. S. E., American edition. New York, 1860.

¶ [illegible]

typhoid from a specific typhus because individual or epidemic constitutional peculiarities seemed insufficient to account for the notable differences in the average cases of each, they hesitated to push the argument and thereby separate fevers of short duration, unaccompanied by typhoid symptoms, from the cases of fully developed typhoid fever. Others, on the contrary, recognized in these febriculæ or ephemeral fevers a distinct clinical entity, and reported them as common continued fever irrespective of etiological considerations. The unknown or suspected cause, whether conceived to be the poison of typhoid or of typhus modified in some way, a specific poison differing from these, or a non-specific irritant, had no weight in the formation of the diagnosis. Dr. WOOD recognized an idiopathic fever resulting from causes of irritation having nothing specific or peculiar in their mode of operation—an inflammatory fever, the synocha of CULLEN, but without any local lesion other than an occasional slight inflammation of the fauces wholly insufficient to account for the intensity of the general symptoms. BENNETT and JENNER also recognized a febricula, though differing in opinion as to its nature, the former considering it a modified typhus and the latter an essential fever due to a specific cause. The clinical features of the cases reported under the name of common continued fever may therefore be readily appreciated.

Remittent Fever.—The paroxysmal fevers of the West and South were well known at the outbreak of the war, even to those of the profession whose practice anterior to their military service had been in non-malarious localities. The importance of these fevers, and the national character of the great medical schools of the North, called for as thorough a discussion of the malarial fevers as of those which constituted the common fever of the North and East. The text-books gave prominence to the endemic fevers. The American edition of *Watson's Practice* contained an article by Dr. CONDIE on remittent fever to fit the work for its new sphere of usefulness. The medical journals showed that the energies of the profession were as much engaged on malarial disease as on typhus and typhoid. The medical officer from the North was therefore well prepared to recognize malarial remittents when presented to him, and perhaps better qualified than the southern practitioner to recognize the to him familiar typhoid fever when occurring in the habitat of malaria. BARTLETT had shown that typhoid fever was to be found in such localities, and WOOD, in speaking of the diagnosis of enteric fever, called special attention to the miasmatic remittent as one of the diseases liable to be confounded with it, especially when the remittent was protracted or attended with 'typhus' symptoms. The figures, reported by our medical officers during the war under the heading remittent fever, may therefore be accepted as giving a fair expression of the prevalence of this form of fever. Mistakes in diagnosis no doubt occurred,—remittent fever may have been recorded as typhoid, especially when it assumed an adynamic form, and, on the other hand, typhoid may have been set down as remittent in localities where the latter was endemic; this will be considered hereafter. It is sufficient for the present to know that the name remittent fever was given to a definite and generally appreciated clinical picture.

Intermitting Fevers.—The intermittents, including the congestive form, were usually characterized by such marked and well-known peculiarities that the conditions indicated by the diagnosis are easily understood.

On June 30, 1862, two changes affecting the method of reporting idiopathic febrile diseases were made in the sick reports. The first involved the disuse of the term common

continued fever. No instructions were issued regarding the disposition to be made of such cases as had heretofore been reported under this designation; but from what has been stated above concerning the tendency developed by the study of typhoid fever, it may be assumed that many of the cases were thereafter reported under that heading while the remainder may have found place under *Other Miasmatic Diseases*. During the year ending June 30, 1862, when the term common continued fever was in use, there were reported under it, per thousand of strength, 42 cases, 1.25 per cent. of which were fatal, while under the term other miasmatic diseases there were reported only 27 cases, with .41 per cent. fatal. During the following year, when no special provision was made for the classification of the cases formerly reported as common continued fever, the cases returned as other miasmatic diseases rose to 50 per thousand and their fatality to 2.84 per cent. A large number of the common continued cases may, therefore, have been returned under this indefinite heading.

The second change consisted of the insertion in the reports of a new term, *Typho-malarial*. The writer has not been able to find the report of the Board that recommended these changes, and is, therefore, ignorant of the arguments which led to the abolition of the one term, but Dr. WOODWARD has detailed the circumstances attending the introduction of the other.* In the autumn and early winter of 1861 the medical officers of the army called attention to the fact that the camp fevers then coming under observation differed in many particulars from the enteric fevers which they had treated in civil practice before the war.† A Board consisting of Surgeon A. N. MCLAREN, U. S. A., Surgeon G. H. LYMAN, U. S. Vols., and Assistant Surgeon M. J. ASCH, U. S. A., was convened, December 16, to investigate and determine whether the fever then prevailing in the army was to be considered an intermittent or bilious remittent fever in its inception, assuming in its course a typhoid type, or a typhoid fever primarily. The board examined the fever in several of the division hospitals of the Army of the Potomac. It communicated by circular letter with many medical officers whose commands could not be conveniently reached. The replies received, in their general tenor, confirmed the opinion which the board had formed on the basis of its personal observation, that while a certain number of cases of ordinary typhoid existed in the army, the large majority of the febrile cases were bilious remittent fevers which, not having been controlled in their primary stage, had assumed that adynamic type which is present in enteric fever. This officially pronounced adynamic remittent prevailed extensively during the Peninsular campaign of the following year and was familiarly known as *Chickahominy fever*. Dr. WOODWARD had served with the army in this campaign, and had formed the opinion that these fevers were hybrid forms resulting from the combined influence of malarial poisoning and the causes of typhoid fever, modified in individual instances in accordance with the preponderance of one or the other of these influences and occasionally by the presence of a scorbutic taint. At this time he was detailed a member of a board to revise the form of sick report in use in the army, and actuated by the strength of his opinions, he induced the board to recommend the insertion of the term typho-malarial in the blank form for the monthly sick report as a suitable designation for the complex conditions which he believed to be present in these cases. He afterwards regretted that he had not also urged upon the board the preparation of a circular

* *Typhomalarial Fever: Is it a Special Type of Fever?* Philadelphia, 1870, pp. 1–32.

† For an illustration of the characters of the fevers occurring at the time specified, refer *infra*, p. 250 *et seq.*, to the admission records of the Seminary Hospital, Georgetown, D. C.

letter to accompany the new sick report, explaining why this term had been adopted, and calling for special reports with regard to the cases which it was intended to designate. This omission was indeed unfortunate, as it left the medical officers without a guide for the use of a term not only of indefinite meaning but absolutely of double meaning. These fevers, in accordance with the views then current, were either remittents with low or typhous symptoms, or they were cases of enteric fever with accidental malarial complications. The uncertainty attaching, in the absence of the necessary instructions, to the value of the first part of the compound word, permitted it to be used as a diagnostic title for both of these series of cases. Indeed it was perhaps better suited to meet acceptance as a designation for low remittents than for cases of true typhoid marked by malarial symptoms, for the compound term *typhoid-pneumonia* was familiar as a household word at the time, and no meaning was conveyed by it involving the presence of the specific poison of enteric fever. Nevertheless Dr. WOODWARD subsequently claimed that the prompt acceptance of the term typho-malarial showed how widely the opinions he had formed were shared by the medical officers of the army. But the sense of the profession cannot be thus construed in support of the view of a specific enteric essential in the typho-malarial cases reported at that time. During the month of July, 1862, the first month of the use of the new term, 2,283 cases were reported, while Dr. WOODWARD's opinions were unknown except to a few personal friends. Indeed his views were not published until the issuance, on September 8, 1863, of *Circular* No. 15, Surgeon General's Office, Washington, D. C. In this the meaning designed to be attached to the term typho-malarial was for the first time made known in the following words:

Moreover, while a certain amount of uncomplicated enteric and remittent fevers certainly did occur, especially at the commencement of the war, the vast majority of the camp fevers of the army were of a mixed character, exhibiting undoubted enteric phenomena variously combined with the periodicity and other peculiarities of malarial disease, and still further modified by the tendency to incipient scurvy, which is the ordinary concomitant of camp diet. To indicate this mixed nature, the term typho-malarial fever, which I had the honor to suggest to the Department in June, 1862, appears appropriate, and, at the present time, is coming into very general use.

Up to the close of the month of August, 1863, shortly before the publication of this circular, 27,399 cases of typho-malarial fever had been reported in a total of 49,871 such cases during the war. In other words, more than one half of the cases were reported during the fourteen months which intervened between the appearance of the term on the reports and the publication of a casual reference to the meaning designed to be attached to it.

The nomenclature of the fevers as officially given in the army sick reports at the beginning of the war gave expression to species with marked clinical distinctions. Uncertainties attached to the etiology of the small percentage reported as common continued fever, but the nature of the uncertainties was fully appreciated—and the segregation of the cases rendered them available for special study. The removal of this term from the sick report complicated the statistics thereafter furnished by doubts as to the disposition made of ephemeral and other febrile cases not distinctly typhoid. What proportion of these were sent to swell the lists of typhoid, how many complicated with the effects of malaria were added to the typho-malarial list, and how many were dropped out of consideration altogether by being placed among other miasmatic diseases, are questions which constantly recur in studying the statistics of fever furnished after June 30, 1862. The insertion of the term typho-malarial was also a grievous complication. The true value of the statistics given under this heading can never be known in the absence of a complete record of all the cases. Such cases as were reported with more or less of detail will be

presented hereafter, and the figures themselves, and those allied to them, will be examined in this connection. In the meantime a consideration of the conditions under which the diagnoses were made will show that clinically typho-malarial cases may have presented great diversity, from the severe and protracted remittent ending fatally with great prostration, low delirium, stupor and coma, and the equally severe cases of typhoid fever ending fatally in like manner, but with some modification in their progress from concurrent malarial poisoning, to the mild enteric and abortive cases viewed doubtfully as typhoid, and diagnosticated, when such diagnosis was officially admissible, as common continued fever, yet recorded with propriety, in accordance with the views of Dr. WOODWARD, as cases of typho-malarial fever, in the presence of indications calling for the exhibition of quinine as an antiperiodic.

CHAPTER III.—ON THE PAROXYSMAL FEVERS.

I.—THE STATISTICS OF THE MALARIAL FEVERS.

I.—MALARIAL FEVERS AMONG THE U. S. FORCES.

PREVALENCE AND MORTALITY.—During and immediately after the war, one-fourth of all the reported cases of disease among the white troops was of a malarial character. There were 224 cases of malarial fever in every thousand cases of reported disease. Typho-malarial fever is included in this statement, as, irrespective of the views entertained concerning its typhoid element, its malarial factor was definitely recognized by all parties. It seems proper, therefore, to consider it in a discussion of the prevalence of malarial disease, although it may be needful to know more about it before its mortality can with propriety be admitted to weigh in the scale with that due to the purely malarial fevers.

The simple intermittent constituted by far the greater proportion of these febrile cases, 2,003 cases per 1,000 of mean strength having been reported in a total of 2,814 of malarial disease; in other words, a distinct period of intermission was recognized in five-sevenths of the paroxysmal fevers. These figures represent only the number of cases in which intermittent fever was the most obvious abnormal condition present. They by no means express the extent to which this disease prevailed, even in that part of the army represented in the statistical tables. As the system of reporting provided no method of recording complications, it very generally happened that cases of intermittent fever complicated with serious diarrhœa, dysentery, pneumonia or other grave affections, were reported under the head of these disorders without any mention of a co-existing malarial affection. But, although understating the facts, the statistics convey a clear idea of the extensive prevalence of this form of malarial disease. Out of 1,213,685 cases of malarial fever 863,651 were cases of simple intermittent. How many of these were first attacks, and how many recurrences in individuals already affected by the malarial influence, cannot be determined. It is probable

that the majority of the primary attacks are included in the number, for a soldier who experienced an ague-fit for the first time was usually disposed to be alarmed at the violence of the symptoms, and to seek medical assistance, even if the nature of the duties required of him at the time was such as to render it needless for him to report for the purpose of being relieved from their performance. On the other hand, it is certain that many of the recurrences which took place were not reported. Men became accustomed to attacks of this kind, and visited the dispensary after the paroxysm, not to report as sick, but to procure a supply of quinine to prevent a return; even when on important duty which they were incapable of performing during the attack, such men would be temporarily excused by their company officers, the medical officer of the command remaining in ignorance of the recurrence.

In more than one-half of the agues the cycle of morbid phenomena was completed in twenty-four hours. Tertians followed closely in order of frequency. Quartans were comparatively rare, forming only one-twentieth of the whole number. Of the 2,003 cases of simple intermittents occurring per 1,000 of mean strength among the white troops during the five and one-sixth years covered by the statistics, 1,037 were quotidians, 870 tertians and 96 quartans.

Congestive fever was fortunately of infrequent occurrence, it having furnished but 32 cases per thousand of strength, constituting 3 of the 224 cases of malarial disease which were recorded in every thousand cases of all diseases.*

Remittent fever gave 664 of the total of 2,814 cases of malarial disease which occurred per thousand of mean strength, or 53 of the 224 malarial cases recorded per thousand cases of all diseases. Excluding the typho-malarial cases, the 664 remittents formed part of 2,699 cases of pure malarial fevers which occurred in every thousand men of the command, or 53 of the 215 pure malarial fevers recorded in every thousand cases of disease. In simpler figures, the remittents formed one-fourth or 24.6 per cent. of the purely malarial fevers, and a little less than this, or 23.7 per cent. of all malarial fevers, including the cases recorded as typho-malarial.† These typho-malarial cases, 115 per thousand of strength, formed only 9 of the 224 malarial cases which occurred in every thousand cases of disease.

The deaths reported among the white troops as occasioned by malarial fevers numbered 12,199; but if to these be added a due proportion of the 42,869 deaths from unspecified diseases, the number becomes augmented to 16,225. Of the 12,199 deaths specially referred to malarial fevers, 4,059 were considered due to typho-malarial manifestations, 3,853 to remittent, 3,370 to congestive and 917 to simple intermittent fevers.

Although congestive fevers were infrequent and remittents formed only one-fourth of the purely malarial fevers, the deaths from these forms of malarial affection were in striking contrast with those from the simple intermittents. The latter numbered less than 2 per thousand of strength, and the former somewhat over 7 and 8 per thousand respectively. Of 1,000 deaths from all diseases, 94 were caused by malarial fever, 31 of these being due to typho-malarial, 30 to remittent, 26 to congestive and 7 to simple intermittent fevers.

In the last column of the table which follows is shown the light rate of mortality in the intermittents, one death in every thousand cases of quotidian or tertian ague, and one

* The relative frequency of the types of intermittent fever expressed as percentages of the total number of intermittent cases which occurred in each of the military departments will be found in Table XXXIII *infra*, p. 98.

† The table mentioned in last note gives also the relative frequency of the forms of malarial fever expressed as percentages of the total number of malarial cases which occurred in each of the departments.

death in every five hundred of the quartans. The greater mortality in the last-mentioned form is at variance with the opinion which regards the quotidian as an expression of a higher degree of the malarial poisoning than is present in the tertian or quartan. Many of these deaths might be passed to the credit of congestive fever, as the fatal result was due to the occurrence of a paroxysm of an aggravated type; while others with equal propriety might be transferred to remittent fever, as, although the case was intermittent originally, and so reported, the fatal issue did not take place until after the fever had assumed the remitting type.

Remittent fever gave a fatality-rate of 1.31 per cent., or one death in 76 cases, and congestive fever 24.65 per cent., or one death in 4 cases. But notwithstanding this high rate of the congestive fevers, such was their infrequency as compared with the less dangerous forms of the disease, that the deaths from the purely malarial diseases amounted only to seven-tenths of one per cent., or, including the deaths from typho-malarial fever, to one death in every hundred cases.

Table XXII.

Statement of the Frequency and Mortality of the several forms of Malarial Fever, giving the totals reported from May 1, 1861, to June 30, 1866, with the ratio of cases to strength and to cases of all diseases, and the ratio of deaths to strength, to deaths from all diseases and to cases of Malarial Fever.

WHITE TROOPS.

Disease.	Number reported during the period from May 1, 1861, to June 30, 1866.		Ratios per 1,000 of strength.		Cases per 1,000 of cases of all diseases.	Deaths per 1,000 of deaths from all diseases.	Percentage of fatal cases.
	Cases.	Deaths.	Cases.	Deaths.			
Quotidian Intermittent	447,258	452	1,037	.96	82	3.49	.10
Tertian Intermittent	375,170	381	870	.81	69	2.95	.10
Quartan Intermittent	41,223	84	96	.18	8	.64	.20
Total simple Intermittent	863,651	917	2,003	1.95	159	7.08	.16
Congestive Fever	13,673	3,370	32	7.20	3	26.05	24.65
Remittent Fever	286,490	3,853	664	8.23	53	29.78	1.31
Total pure Malarial Fevers	1,163,814	8,140	2,699	17.38	215	62.91	.70
Typho-malarial Fever	49,871	4,059	115	8.67	9	31.37	8.14
Total Malarial Fevers	1,213,685	12,199	2,814	26.05	224	94.28	1.00

But although the mortality from these fevers was comparatively light, their influence in detracting from the efficiency of the army must have been very great. We have no means of ascertaining how many men constantly on sick report would represent this loss, nor can we learn how many were permanently removed from active service by discharge on account of the pernicious influence of the fever-poison on the constitution. The statistics show that 373 men were discharged for remittent fever and 480 for intermittent fever;

but when it is recognized that there were 2,224 cases in which dropsy figured as the cause of disability necessitating discharge, 14,500 having debility as the nominal cause, and 25,915 in which the cause was not stated, we are left to speculate upon the influence which these fevers may have exercised in the production of temporary and permanent disablement to our armies.

The malarial fevers as they affected the colored troops are shown in the following table:

TABLE XXIII.

Statement of the Frequency and Mortality of the several forms of Malarial Fever, giving the totals reported from July 1, 1863, to June 30, 1866, with the ratios of cases to strength and to cases of all diseases, and the ratios of deaths to strength, to deaths from all diseases and to cases of Malarial Fever.

COLORED TROOPS.

DISEASE.	Number reported during the period from July 1, 1863, to June 30, 1866.		Rates per 1,000 of strength.		Cases per 1,000 of cases of all diseases.	Deaths per 1,000 of deaths from all diseases.	Percentage of fatal cases.
	Cases.	Deaths.	Cases.	Deaths.			
Quotidian Intermittent	63,992	58	1,047	.91	106	2.11	.09
Tertian Intermittent	51,045	54	835	.85	84	1.96	.10
Quartan Intermittent	3,923	15	64	.23	7	.55	.30
Total simple Intermittent	118,960	127	1,946	1.99	197	4.62	.10
Congestive Fever	2,536	794	42	12.42	4	28.88	31.31
Remittent Fever	30,645	1,002	501	15.67	50	36.43	3.27
Total pure Malarial Fevers	152,141	1,923	2,489	30.08	251	69.93	1.26
Typho-malarial Fever	7,529	1,301	123	20.35	12	47.31	17.27
Total Malarial Fevers	159,670	3,224	2,612	50.43	263	117.24	2.02

In comparing this table with that given for the white troops, it must be remembered that while the latter includes the statistics of five and one-sixth years the former embodies the records of only three years of service. If it be assumed that the rates of prevalence and mortality which were found in these three years among the colored troops would have prevailed had the observations been continued for five and one-sixth years, the ratio of cases per thousand of strength would have been 4,498 as compared with 2,814 among the whites, and the deaths 86.88 as compared with 26.05, or, in other words, for every 100 cases occurring among a given number of white soldiers in a certain time, 160 cases would have occurred among the same number of colored troops in the same period, and for 100 deaths from malarial fever occurring among the white, 334 deaths would have been recorded in the same time among the same number of colored troops. This is definitely shown in Table XXVI, where the sickness and deaths for both races are tabulated as annual averages.

But the element of time does not affect the comparative value of the figures in the last three columns of the table at present under consideration. Thus the increased mor-

tality which has just been indicated is in the last column distributed among the various forms of fever. Of 100 cases of congestive fever among the colored troops 31.31 died, or 1 in 3.2 cases, as against 1 in 4 among the whites; of the same number of remittent cases 3.27 died, or 1 in 30 as against 1 in 76 among the whites: of 100 typho-malarial cases 17.27 died, or 1 in 5.8, as against 1 in 12 among the whites. The influence of this increased mortality in the more dangerous forms of malarial fever among the colored troops was such that the percentage of fatality of the malarial fevers as a class among the colored men is found to be as large again as that which obtained among the white soldiers: thus, the purely malarial fevers gave a mortality of 0.7 per cent., or 1 in 143 cases among the latter, and 1.26 per cent., or 1 in 79 among the former; while, if typho-malarial fever is taken into consideration, its greater fatality among the blacks will be found to raise their percentage of fatal cases to 2.02 as compared with 1.00 among the white troops. But it may not be inferred from these facts that negro troops are more liable to malarial causes and more prone to succumb to the malarial influence than white troops, until it has been shown that both bodies of men were exposed to similar influences.

The tabulated statistics of malarial disease have reference solely to the fevers. It is not possible to ascertain the actual number of men who suffered from chronic malarial poisoning during the civil war. Most of them were undoubtedly reported under the head of the intercurrent diseases which were developed during the progress of the cachexia. Large numbers were registered as cases of general debility or other diseases of the miasmatic order. Under these headings 101,892 cases with 1,981 deaths were reported among the white troops and 11,887 cases with 535 deaths among the colored troops: moreover, there were 14,509 white, and 540 colored, soldiers discharged the service for debility. Under the head of anæmia 21,892 cases, 438 deaths and 347 discharges on certificates of disability were reported among the white troops: 2,771 cases, 258 deaths and 35 discharges among the colored. Men broken down by the most diverse morbid conditions were included in these figures: and although all who had opportunity of observing large numbers of such cases during the war will testify to the frequency with which the malarial cachexia occurred among them either as the chief morbid condition or as a complication there is no possibility of giving even an approximate numerical expression of the fact. It may be added that, according to the tables in the *First Medical Volume*, 1,977 cases, 17 deaths and 171 discharges on account of *diseases of the spleen* were reported among the white troops, and 55 cases, 3 deaths and 3 discharges among the colored men; and although the majority of these cases were instances of malarial enlargement of the organ, it cannot be supposed that the numbers represent any very considerable proportion of the actual cases, which were usually recorded under other heads, such as intermittent fever, debility and anæmia. Nor is it possible to determine the number of cases of malarial cachexia that terminated in dropsy, though it must be believed that a large number recorded as general dropsy, abdominal dropsy, and *dropsy from hepatic disease* had this origin. Under these headings 7,337 cases and 398 deaths were reported among the white troops; and 2,224 men are said to have been discharged for *dropsy*. Under the same headings 1,427 cases, 272 deaths and 109 discharges were reported among the colored troops.

Of pernicious remittent manifestation of malarial poisoning, 58,774 cases were noted among the white and 6,918 among the colored troops. A number of these cases may have

been due to malaria, but it is difficult to believe that the majority were so, for neither in their geographical distribution nor in the season at which they were most prevalent do the figures reported agree with the distribution of the reported cases of intermittent fever.*

The occurrence of malarial fever in connection with diarrhœa and dysentery has already been shown.†

Annual variations in prevalence and mortality.—Turning now to Table XXIV, illustrating the relative frequency and mortality of these febrile affections among white troops during the several years covered by the statistics, it is found that their prevalence increased gradually to the fourth year, or that ending June 30, 1864, when the war maximum was attained, diminished somewhat during the fifth year, and experienced a marked increase during the sixth, or year succeeding the war. This marked advance to the fourth year, and slight diminution during the fifth year, was due to the influence of the mass of the intermittents on the figures representing the prevalence of the other forms; for both congestive and remittent fevers were slightly more prevalent during the second year than during any other of the years of the war.

TABLE XXIV.

Relative Frequency of cases of Malarial Fevers, and Deaths caused by them, during the several years of the war and the year following the war, expressed in annual rates per 1,000 of mean strength.

WHITE TROOPS.

DISEASES.	1860-1.		1861-2.		1862-3.		1863-4.		1864-5.		1865-6.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Quotidian Intermittent	56.17	.....	144.36	.11	163.01	.21	230.51	.17	221.93	.21	364.92	.32
Tertian Intermittent	59.63	.....	95.81	.11	134.23	.18	210.44	.19	184.38	.12	295.58	.26
Quartan Intermittent	10.25	.....	12.62	.01	16.07	.06	22.87	.03	19.39	.03	24.70	.01
Total simple Intermittents	126.05	.....	252.79	.24	313.31	.45	463.82	.39	425.70	.36	685.20	.59
Congestive Fever	5.20	.02	7.99	1.25	9.45	1.56	9.10	1.53	4.90	1.12	8.20	2.29
Total	131.25	.02	260.78	1.49	319.76	2.00	469.98	1.92	430.60	1.48	693.40	2.85
Remittent Fever	43.60	.....	143.26	1.25	140.38	1.76	114.12	1.27	127.84	1.86	159.70	2.35
Total pure Malarial Fevers	174.85	.02	404.04	2.77	460.14	3.76	584.10	3.19	558.44	3.34	853.10	5.42
Typho-malarial Fever	.....	.....	.....	.....	38.00	1.78	18.93	1.71	22.91	2.27	16.62	2.54
Total Malarial Fevers	174.85	.02	404.04	2.77	498.14	5.54	603.03	4.90	581.35	5.61	869.72	7.96

The increased prevalence of malarial fever during the year succeeding the war was probably due to the occupation of Southern and malarious territory by the army, and the concurrent discharge from service of troops stationed in Northern and less malarious sections. Although this increase is observable in all the forms of malarial fever, each reaching a higher figure per thousand of strength than in any of the previous years, the intermittents constituted absolutely and relatively its greater portion. As will be seen hereafter in Table XXXII, the troops in the Department of Arkansas had the highest malarial record, and among them intermittents were relatively more frequent and remittents less frequent than among troops in less malarious localities.

* See article on Neuralgia, *infra*, page 874.

† In the second part of this work, pp. 287, 398, 495 and 637.

Typho-malarial fever, however, during these years did not follow the course of the uncomplicated malarial fevers. Its presence was not reported during the first two years embraced in Table XXIV. During the year ending June 30, 1863, there were 38 cases per thousand of strength. In the following year, when malarial fevers were at their war maximum, typho-malarial fever fell off one-half, to 18.30, increasing slightly during the last year of the war and subsiding to its minimum, when the pure malarial fevers were at their minimum, during the year succeeding the war.

In general the mortality of the malarial fevers increased with their increased frequency; thus, in the year after the war, with 853 cases per thousand of strength there were 5.42 deaths; while in 1861–2, with 404 cases the deaths were 2.77. But in the typho-malarial fevers an increased mortality was associated with a diminished prevalence: in the year 1862–3, with 18 cases per thousand of strength, the corresponding death-rate was 1.78; while in 1863–4, with 10.82 cases, the rate of deaths rose to 2.34.

Similar results are obtained by an examination of the statistics from the colored regiments, as given in—

TABLE XXV.

Relative Frequency of Cases of Malarial Fevers and of Deaths caused by them among the Colored Troops during two years of the war and the year following the war, expressed in annual rates per 1,000 of mean strength.

DISEASES.	1863–4.		1864–5.		1865–6.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Quotidian Intermittent	362.60	.46	308.67	.29	398.94	.19
Tertian Intermittent	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Quartan Intermittent	23.96	.13	21.57	.08	19.02	.04
Total Simple Intermittent	663.06	1.00	565.43	.63	763.30	.44
Congestive Fever	23.62	7.76	11.12	3.42	9.97	2.33
Total	686.68	8.76	576.55	4.05	773.27	2.77
Remittent Fever	147.04	6.43	173.48	4.72	173.73	5.04
Total pure Malarial Fevers	833.72	15.19	750.03	8.77	947.00	7.81
Typho-malarial Fever	56.15	10.85	37.47	5.51	34.21	5.49
Total Malarial Fevers	889.87	26.04	787.50	14.28	981.21	13.30

These figures cover only the last two years of the war and the year succeeding the war. The year ending June 30, 1864, yielded a higher ratio of cases than that which followed it; but as in the case of the white troops, not so high a rate as was attained after the cessation of hostilities. Here also the preponderance of the intermittents is the cause of the varying rates in the annual progress of these fevers; for, while the congestive fevers were most prevalent during the first year succeeding a like report will the intermittents generally. The remittents were most prevalent during the year

Typho-malarial cases were most prevalent, 56 per thousand of mean strength, during the first year of the service of the colored troops, diminishing to 37 and 34 per thousand during the two following years.

Relative prevalence and mortality among the white and the colored troops.—The following table consolidates the data of the last two tables, giving the annual average ratios per thousand of strength as deduced from the experience of five and one-sixth years of service by the white troops and of three years of service by the colored troops:

TABLE XXVI.

Relative Frequency among the White and the Colored Troops of Cases of Malarial Fevers and of Deaths caused by them, as shown by the average number annually recorded, reduced to ratios per 1,000 of strength.

DISEASES.	WHITE TROOPS.		COLORED TROOPS.	
	Cases.	Deaths.	Cases.	Deaths.
Quotidian Intermittent	200.73	.19	348.93	.30
Tertian Intermittent	168.39	.16	278.33	.28
Quartan Intermittent	18.50	.03	21.40	.08
Total simple Intermittent	387.62	.38	648.66	.66
Congestive Fever	6.14	1.39	13.82	4.14
Total Intermittents	393.76	1.77	662.48	4.80
Remittent Fever	128.58	1.59	167.10	5.23
Total pure Malarial Fevers	522.34	3.36	829.58	10.03
Typho-malarial Fever	(*a*) 26.15	(*a*) 1.95	11.04	6.79
Total Malarial Fevers	(*a*) 544.72	(*a*) 5.04	870.62	16.82

(*a*) As the annual rates of typho-malarial fever among the white troops are derived from the statistics of four years while the rates of the totality of the malarial fevers cover five and one-sixth years of observation, the latter differ somewhat from the sum of the rates of the purely malarial and typho-malarial fevers.

The greater prevalence of all forms of malarial fever among the colored troops is as well shown in the various items of this table as in the totals of 544.72 cases per thousand of mean strength among the white, and 870.62 among the colored men. These figures are as 100 to 160. The greater mortality among the negroes is equally well shown, and is especially marked in the more serious forms, giving an average annual total of 16.82 deaths per thousand of strength as compared with 5.04 among the white troops: figures which are in the ratio of 334 to 100. As has already been seen,* the deaths formed 1.00 per cent. of the cases in the white and 2.02 per cent. in the colored regiments.

These statistics indicate that the colored race exhibited a greater susceptibility to the malarial poison than was shown by the white commands, or that the colored troops

*Tables XXII and XXIII, pp. 79 and 80, *supra*.

were exposed to influences of a more deleterious nature.* It would, however, be injudicious to attach weight to a comparison of the annual averages given in Table XXVI as bearing on the relative liability of the white and the colored troops to the malarial influence. Large numbers of the white troops served in departments which were comparatively salubrious, and the influence of their records is felt in diminishing the average ratios for the white commands as a whole. The black men, on the contrary, were aggregated in malarious districts. Those serving in the Atlantic region were mainly stationed in the Departments of the South, of North Carolina and of Virginia, and those on duty in the Central region held fortresses along the Mississippi bottom and in the Department of the Gulf. Manifestly, in making a comparison to determine relative prevalence, locality must be taken into consideration. The records do not enter with sufficient minuteness into the conditions of service of the white and the colored commands to enable their relative susceptibility to be determined. In fact the question was seldom touched upon by our medical officers. The writer is aware that the officers on duty at the Field Hospital for colored troops at City Point, Va., were of the opinion that although the colored people under similar conditions of exposure might be less liable to seizure than the whites, they were assuredly much less able to resist the febrile influence when the attack was developed. Surgeon JOHN FISH, 17th regiment Corps d'Afrique, appears to have entertained the belief that the negro was as liable to malarial attacks as the white soldier.†

The 17th regiment Corps d'Afrique was recruited at Baton Rouge, and first mustered August 10, 1863. Its strength at that time was 700 men. We left Baton Rouge on steamer for Port Hudson, September 18, 1863, and have been on duty here ever since. The most frequent diseases have been diarrhœa and dysentery, intermittent fever, typhoid fever, scurvy, pneumonia and rheumatism.

I had supposed the black man to be peculiarly exempt from diseases due to malarial influences; but I should not expect to have encountered a greater number of cases of intermittent fever in a body of white troops equalling ours in number than we have actually had.—*Port Hudson, La., Feb.* 25, 1864.

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* Some writers have claimed for the negro race an immunity from malarial disease. Thus FERGUSON in his article *On the Nature and History of the Marsh Poison*, Trans. Royal Society, Edinburgh, Vol. IX, says:—"The adaptation of the negro to live in the unwholesome localities of the [illegible] that prove so fatal to Europeans, is most happy and singular. From peculiarity of idiosyncrasy he appears to be proof against fevers; for [illegible] miasmata are in fact no poison, and hence his incalculable value as a soldier, for field service in the West Indies. The warm, moist, low, [illegible] situations, where these pernicious exhalations are generated and concentrated, prove to him congenial in every respect. He delights in [illegible] life and health, as much as his feelings are abhorrent to the currents of wind that sweep the mountain tops; where alone the [illegible] endemic fevers. One of the most obvious peculiarities of the negro as compared with the European is his thick oily skin, [illegible] negroe; and from this circumstance the theorist, when he speculates upon the mode of reception of the marsh poison into the constitution, [illegible] lungs, stomach, or skin, may draw a plausible conjecture in favor of the last."

† Dr. S. ANDREWS, in a letter published in the Chicago Med. Examiner, Vol. III, 1862, p. 481,—speaks of the prevalence of intermittent and [illegible] among the troops near Memphis, Tennessee, during the summer of 1862, and remarks that he constantly observes these fevers among the negroes whose powers of resistance he conceives to have been greatly over-estimated. See also an interesting paper by Dr. SANFORD B. HUNT—*The [illegible]* The Quarterly Jour. of Psychological Medicine, Vol. I, 1863, p. 161 *et seq.* These fevers were, moreover, exceedingly common [illegible] people who received medical assistance from the Freedman's bureau. In an article entitled *Remarks concerning some of the diseases prevailing among the freed people in the District of Columbia* (Bureau Refugees, Freedmen and Abandoned Lands), American Journal of the Medical [illegible] Surgeon [illegible] reports [illegible] cases of intermittent and inter- [illegible] of the whole number of persons of the race treated, and further on, in answer to and refutation of the statement [illegible] our text-books, that the negroes are not subject to, and do not suffer from, malarial disease. "Now it may be that in Africa, and [illegible] do not suffer to the same extent as unacclimated whites do, but they certainly are not exempt from these diseases in this country; [illegible] as the observation goes, we are strongly inclined to the belief that this so-called exemption has no foundation in fact and is unworthy of credence." The testimony in favor of any supposed immunity of the colored troops from these diseases during any part of the war is contained in a report by Surg. N. S. TOWNSHEND, U. S. A., cited in the American Med. Times, Vol. VII, 1863, p. 65. This report is on file in the office of the Surgeon-General and is dated May 19, 1863. It relates to an inspection of Forts St. Philip and Jackson, near the mouth of the Mississippi river, and contains the following statement: "Of the troops at the forts four-fifths are of the 13th Maine, and one-fifth Louisiana negroes. The comparative [illegible] from diseases of malarial origin is most marked. Of the entire white force 10.8 per cent. had intermittent or remittent fever, while [illegible] per cent. suffered from those diseases. In respect to other diseases their liability appeared nearly equal." This statement [illegible] time and place referred to are concerned, though it cannot be verified because in the report of sick and wounded at this post [illegible] Maine and one battery of Louisiana heavy artillery, are unfortunately consolidated. But whatever may have been the cause of the [illegible] the subsequent separate reports of the colored troops at this post show no such immunity from intermittent or remittent [illegible] reference may be made to the statement of A. G. TEBAULT with regard to the "Negroes of Virginia," as cited by T. P. [illegible]—*Remarks on [illegible] physiological and pathological differences between the white and the black races, etc.*, Trans. of the Third Annual [illegible] of Virginia, held at Staunton, Nov., 1872, Richmond, 1873, Appendix E, p. 112, "Cases of intractable intermittent are rarely [illegible] from the [illegible] of the spleen, or the quartan ague."

But this is an opinion based upon one-sided experience. To ascertain the fact, statistics are required from white and colored commands camped or operating in the same localities at the same time. In their absence, the following table may be of interest as presenting the rate of prevalence among the colored troops during the fourth and fifth years of the war in juxtaposition with the rates prevailing among the whites during the same period in the same departments or sections of the country.*

TABLE XXVII.

A Comparison of the Prevalence of Malarial Fevers among the White and the Colored Troops serving in the same localities during the two years from July 1, 1863, to June 30, 1865, the figures given being the average annual ratios per 1,000 of strength.

	White Troops.				Colored Troops.			
	Remittents.	Intermittents.	Typho-malarial.	Total Malarial.	Remittents.	Intermittents.	Typho-malarial.	Total Malarial.
Department of Virginia	88	676	25	789	-- (a) --	-- (a) --	-- (a) --	-- (a) --
Department of North Carolina	244	1,364	33	1,641				
Department of the South	108	497	46	651				
The above Depts. of the Atlantic Region	129	786	33	948	140	412	44	596
Department of the Gulf	147	779	24	950	-- (a) --	-- (a) --	-- (a) --	-- (a) --
Division of Mississippi and Department of Tennessee	144	542	16	702				
Department of Arkansas	166	1,107	18	1,291				
The above Departments of the Central Region	147	664	18	829	176	715	44	935
Total in these sections of the Atlantic and Central Regions	143	692	22	857	164	615	44	823

(a) The statistics of the Colored Troops having been consolidated by regions, it is impossible now to distribute the cases among the several Departments.

From this table it appears that in those departments of the Atlantic region in which white and colored troops served during the period stated, malarial fevers prevailed more extensively among the white men, they having presented 948 cases per thousand of mean strength annually as compared with 596 among the colored troops. In the departments of the Central region, however, the colored men suffered more than the whites. The aggregate rates in these various sections show the fevers as somewhat more prevalent among the white troops—857 per thousand annually as against 823 among the colored men.

* The Mortality Tables of the Tenth U. S. Census, 1880, do not furnish satisfactory information concerning the relative prevalence and fatality of malarial fevers among the white and colored population. The returns are known to be very incomplete. A comparison with the death records of the registration offices of the States of Massachusetts and New Jersey showed a deficiency on the part of the census tables of 26.42 per cent. of the whole number returned by them in the former, and of 34.45 per cent. in the latter, State. This would not affect a calculation intended to give expression to the relative frequency of death from any specified cause in the two races were the deficiency equally distributed; but it is recognized by Dr. BILLINGS, p. 1706, *Compendium of the Tenth Census of the United States*, 1880, that in the sections of country having the largest colored population the greatest deficiencies were found, and that these were probably greater among the colored than among the white population. With the knowledge that the ratios for the colored people were in all likelihood greater than is represented by the figures, the following table may be examined:

The statistics do not furnish the necessary data for determining the relative mortality among white and colored commands operating in the same departments.

		Population.	Total deaths from malarial fever.	Deaths per 100,000 living.
Group 2nd Census Tables, Middle Atlantic Coast	White	3,857,503	1,284	33
	Colored	518,632	238	46
Group [illegible] Census Tables, Interior Plateau	White	4,990,587	791	16
	Colored	724,096	374	51
Group [illegible] of Census Tables, Southern Interior Plateau	White	1,653,096	1,410	85
	Colored	1,972,449	1,784	90

The second group comprises Delaware, the District of Columbia and parts of New York, New Jersey, Maryland and Virginia; the eighth includes parts of New York, Pennsylvania, Virginia and North Carolina; and the eleventh, parts of South Carolina, Georgia, Alabama, Mississippi and Tennessee. According to this tabulation the colored race is more liable to death from malarial fevers in these sections of the United States; but that this does not [illegible] ns of race seems indicated by the fact that although in the more malarious regions the death-rate of both races is increased, the relative [illegible] greater among the whites. Until proved otherwise it may be assumed that the higher death-rate among the negroes is due to greater [illegible]

The mortality figures returned by the health officers of certain cities have been tabulated below as bearing on the point at issue. These figures [illegible] a regular system of registration, based in most instances on the requirement of burial permits, are probably very nearly accurate [illegible] they represent deaths which occurred within certain restricted limits of territory, they may be considered as possessing better qualifications for a [illegible]ve inquiry than the figures of the census reports:

Comparison of the Death-rate from Malarial Disease among the White and Colored population of certain cities of the United States, from data taken from the Consolidated Mortality Report of the National Board of Health for the year 1881. *Bulletin of the Board, Vol. III, pp.* 324–327.

Cities and Towns.	Population.		Deaths from malarial disease.		Ratio of deaths per 100,000 of living.	
	White.	Colored.	White.	Colored.	White.	Colored.
District of Columbia	120,000	60,000	78	84	65.0	140.0
Norfolk, Virginia	11,988	10,283	17	21	142.5	209.3
Portsmouth, Virginia	35,756	28,047	11	10	30.8	35.7
Lynchburg, Virginia	7,484	8,475	2	4	26.7	47.2
Petersburg, Virginia	10,000	12,000	3	7	30.0	58.3
Wilmington, North Carolina	6,870	10,402	6	13	87.0	124.3
Charleston, South Carolina	22,712	27,287	9	9	39.6	33.0
Augusta, Georgia	12,364	11,000	6	5	48.5	46.9
Atlanta, Georgia	21,000	10,335	5	3	23.7	18.3
Savannah, Georgia	15,007	15,674	30	24	199.9	153.1
Mobile, Alabama	16,035	14,308	19	11	122.8	70.7
Selma, Alabama	3,345	4,184	8	22	239.1	525.8
Columbus, Mississippi	2,760	2,470	1	2	36.2	81.0
Natchez, Mississippi	3,421	3,637	2	1	58.5	27.5
Vicksburg, Mississippi	5,575	5,839	19	20	318.0	342.5
New Orleans, Louisiana	158,370	57,761	237	119	149.6	206.0
Shreveport, Louisiana	3,730	7,278	16	27	428.9	371.0
Baton Rouge, Louisiana	2,917	4,300	5	7	171.4	162.8
Galveston, Texas	10,000	5,353	10	5	50.2	93.4
San Antonio, Texas	17,525	3,036	12	2	68.5	65.9
Nashville, Tennessee	27,000	16,457	11	15	40.7	91.1
Memphis, Tennessee	18,922	14,971	20	27	105.7	180.3
St. Louis, Missouri	328,292	22,200	345	42	105.1	189.4
	855,591	396,462	872	489	100.4	133.0

It is not possible, in view of these figures, to decide whether the negro is less susceptible to the malarial influence than the white race: but the assertion may be allowed,

In twenty-three United States cities which contain a notable colored population, the death-rate from malarial fever among the white people in 1881 was in nine cities larger than that of the colored people; but the excess in the other direction was so great in the remaining fourteen cities that in a total population of 868,891 white and 360,922 colored, the deaths were 100 in every 100,000 of the former and 133 in every 100,000 of the latter. It is probable that local conditions were involved in the production of the various death-rates given in this table: for although in some towns that are notably malarious, as Shreveport, Louisiana, and in others that are not so, as Atlanta, Georgia, the death-rate among the colored people was less than among the whites; in some that are notably malarious, as Selma, Alabama, and Vicksburg, Mississippi, and in others that are not so, as Richmond and Lynchburg, Virginia, the death-rate among the colored people was greater than among the whites. The only inference that may with propriety be drawn from these municipal statistics is that which has been reached in the text from a comparison of the figures relating to malarial fevers in the white and colored commands during the war: that the colored race suffers greatly from these fevers, but whether to greater or less extent than the white race, cannot be determined in the absence of a thorough knowledge of the surroundings and exposure. Manifestly, since in any of these cities the colored people may or may not have been aggregated in unhealthy localities, nothing can be said of their relative liability to malarial fevers until a comparison is made of the prevalence of these fevers in the two races in certain wards or sections of the city having the same medical topography.

Our army experience since the war presents statistics which ought to be of more value in this connection than those heretofore adduced. Certain posts have been occupied by a mixed garrison of white and colored troops. The two commands have been similarly quartered, clothed and rationed; they have performed the same guard, fatigue, escort and scouting duties, and have necessarily been exposed to the same malarious influences. Moreover, the same medical authority has supervised the record of the sickness of both races. The facts tabulated below may therefore be accepted as obtained under conditions which permit the relative liability of the white and colored races to be as satisfactorily tested as if they had been specially arranged for the experiment. Unfortunately, however, owing to the small number of posts garrisoned by mixed commands, the strength represented is small.

TABLE *exhibiting the Prevalence of Periodic Fevers at different Posts in the Department of Texas.*

Posts.	Troops.	Year.	Mean strength.	Remittent Fever.	Quotidians.	Tertians.	Quartans.	Typho-malarial Fever.	Annual rate of cases of Malarial Fever per 1,000 strength.
Fort Bliss, Texas	White	1878–9	60	.....	16	.....	.....	16	266.6
	Colored		**52**	.....	**11**	.....	.....	**11**	**211.5**
Fort Bliss, Texas	White	1879–80	54	.....	14	.....	.....	14	259.3
	Colored		**26**	.....	**4**	.....	.....	**4**	**153.9**
Fort Brown, Texas	White	1876–7	340	18	91	4	.....	113	332.4
	Colored		**56**	.....	**5**	**1**	.....	**6**	**107.1**
Fort Clark, Texas	White	1876–7	256	11	14	10	.....	35	136.7
	Colored		**120**	**3**	**3**	**1**	**1**	**8**	**66.6**
Fort McIntosh, Texas	White	1878–9	98	3	31	1	.....	35	357.1
	Colored		**99**	.....	**37**	.....	.....	**37**	**373.7**
Fort McIntosh, Texas	White	1879–80	65	4	7	1	.....	12	184.6
	Colored		**137**	**4**	**22**	.....	.....	**26**	**189.8**
Fort McKavett, Texas	White	1876–7	263	5	14	10	.....	29	110.3
	Colored		**59**	.....	**2**	**1**	.....	**3**	**50.8**
Fort McKavett, Texas	White	1877–8	164	3	21	5	.....	29	176.8
	Colored		**30**	**1**	.....	.....	.....	**1**	**33.3**
Fort Ringgold, Texas	White	1876–7	199	30	113	8	.....	151	758.8
	Colored		**74**	**3**	**24**	.....	.....	**27**	**364.9**
Fort Ringgold, Texas	White	1877–8	155	21	18	2	.....	41	264.5
	Colored		**78**	**12**	**4**	**1**	.....	**17**	**217.9**
Fort Ringgold, Texas	White	1878–9	126	10	8	4	.....	22	174.6
	Colored		**119**	**19**	**10**	**1**	.....	**30**	**252.1**
Fort Ringgold, Texas	White	1879–80	107	1	11	3	.....	15	140.2
	Colored		**166**	**5**	**12**	**1**	.....	**18**	**108.4**
Total White			1,887	106	358	48	.....	512	271.3
Total Colored			**1,016**	**47**	**134**	**6**	**1**	**188**	**185.0**

At Forts Bliss, Brown, Clark and McKavett, Texas, there was a greater prevalence among the white troops; at Fort McIntosh the white and colored troops suffered at about the same rate; while at Fort Ringgold, in the year 1878–9, there were more malarial cases among the colored than among the white soldiers. But in dealing with such small numbers as are represented at each of these posts the records of a single garrison do not have much value, as they may be affected by unknown local conditions. The totals tabulated show a less degree of prevalence among the colored troops, the annual rate per thousand among them being 185.0, while among the white troops it was 271.3.

that the colored troops did not suffer in a marked degree as compared with the white men, although it is not unlikely, from the then generally accepted belief in their partial immunity, that they were often stationed in localities that would have proved specially dangerous to white men. It is probable, therefore, that if strictly comparable figures were obtained they would show the black man to be less susceptible to malarial attacks than the white soldier.

Seasonal variations in Prevalence.—The following table shows the monthly rates of malarial cases among the white troops, and permits a comparison to be made between the rates among the troops operating in the several regions.

Looking first at the totals in the army, the purely malarial fevers (the intermittents and remittents) are seen to have a distinct maximum and minimum of prevalence in each year. These seasonal variations will be more readily followed by a reference to the diagram facing page 90. The maximum in the year ending June 30, 1862, was attained in the months of September and October, 1861, when the monthly ratios were 61.3 and 60.7 respectively, and the minimum in January, February and March, 1862, when the ratios were respectively 18.8, 18.2 and 17.0. In October of 1862 the maximum, 62.6, was again reached, after which the fevers subsided rapidly, and comparatively few cases occurred during the months of January, February, March and April, 1863, the ratios for these being 29.4, 26.8, 28.6 and 29.3. A steady increase in the number of cases reached its maximum in August and September, with ratios of 88.5 and 80.7 per thousand of strength. The fall to the minimum in January and February, 1864, was as

TABLE XXVIII.

Showing the Seasonal Variations in the Prevalence of Malarial Fevers among the White Troops in the several regions during the years of the War and the year following the War, expressed in monthly ratios per 1,000 of mean strength.

YEAR ENDING JUNE 30, 1862.

Disease.	Region.	1861.						1862.						For the Year.
		July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Intermittent (including Congestive) Fever	Atlantic	10.2	27.6	39.4	34.6	22.2	14.2	7.9	8.5	6.9	12.3	15.2	15.8	195.9
	Central	38.9	67.0	56.9	65.5	41.7	30.7	21.9	17.2	19.1	26.7	27.6	27.1	379.9
	Pacific	8.2	20.6	18.2	21.7	20.1	13.9	7.2	10.1	8.8	10.0	8.9	13.0	161.8
Intermittent in all the regions		22.2	35.9	43.2	44.2	28.4	19.6	11.7	10.8	10.5	18.9	21.2	21.2	260.8
Remittent Fever	Atlantic	2.8	9.9	15.9	16.0	13.7	9.3	5.7	6.7	5.3	8.5	15.8	14.2	124.4
	Central	13.5	31.6	26.3	18.4	18.6	13.3	11.3	10.0	9.5	12.6	15.7	17.9	182.1
	Pacific	.9	.4	1.3	7.4	3.1	4.5	1.2	1.8	4.3	8.5	1.7	8.9	55.0
Remittent in all the regions		7.2	14.3	18.1	16.5	14.9	10.5	7.1	7.4	6.5	10.4	15.8	15.9	143.2
Intermittent and Remittent	Atlantic	13.1	37.5	55.2	50.6	35.9	23.5	13.5	15.1	12.2	20.8	31.0	30.1	320.3
	Central	52.4	98.5	83.2	83.9	60.3	44.0	33.2	27.2	28.7	39.3	43.4	45.0	562.0
	Pacific	9.1	21.0	19.5	29.1	23.2	18.5	8.4	11.9	13.1	18.5	10.6	21.9	216.9
Total Malarial in all the regions		29.4	50.2	61.3	60.7	43.3	30.1	18.8	18.2	17.0	29.3	37.0	37.1	404.0

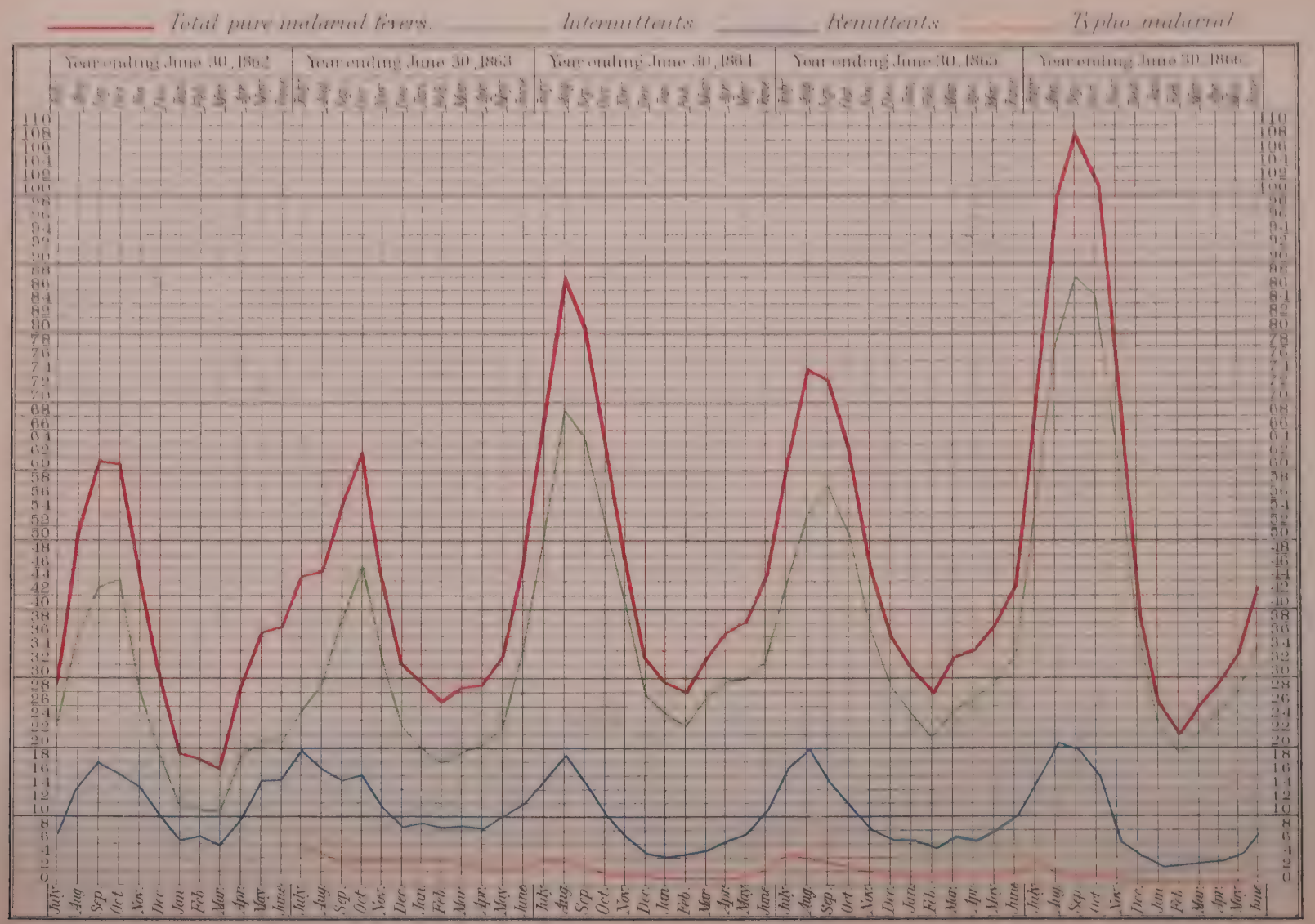
YEAR ENDING JUNE 30, 1863.

Disease.	Region.	1862.						1863.						For the year.
		July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Intermittent (including Congestive) Fever..	Atlantic...	20.4	21.4	24.4	30.8	19.4	12.9	11.3	8.6	9.2	10.4	15.3	18.8	191.2
	Central....	32.3	36.8	56.3	61.2	46.0	33.9	28.5	26.9	29.2	28.6	29.1	44.0	440.8
	Pacific	12.5	17.4	17.6	11.4	11.1	8.0	8.2	6.0	7.3	8.2	7.7	9.8	124.5
Intermittent in all the regions		25.4	28.8	39.3	46.3	33.2	23.1	19.9	17.9	19.5	20.3	23.0	34.3	319.8
Remittent Fever	Atlantic...	21.4	16.1	13.4	16.7	10.5	8.0	8.0	6.6	6.7	6.8	8.5	9.0	123.3
	Central....	19.0	18.1	18.4	16.3	12.6	10.3	11.2	11.2	11.6	10.9	12.2	14.9	158.3
	Pacific	2.4	6.6	15.0	7.0	5.7	2.7	1.5	.7	1.8	4.0	3.6	3.2	53.6
Remittent in all the regions		19.9	16.9	15.8	16.3	11.5	9.1	9.5	8.9	9.1	9.0	10.5	12.5	140.4
Intermittent and Remittent	Atlantic...	41.8	37.5	37.8	47.5	29.9	20.9	19.3	15.2	15.9	17.2	23.8	27.8	314.5
	Central....	51.3	54.9	74.7	77.5	58.6	44.2	39.7	38.1	40.8	39.5	41.3	58.9	599.1
	Pacific	14.9	24.0	32.6	18.4	16.8	10.7	9.7	6.7	9.1	12.2	11.3	13.0	178.1
Total in all the regions		45.3	45.7	55.1	62.6	44.7	32.2	29.4	26.8	28.6	29.3	33.5	46.8	460.2
Typho-malarial Fever	Atlantic...	6.1	4.1	3.3	3.4	3.8	3.8	4.2	2.9	2.7	2.5	2.7	3.5	42.3
	Central....	4.8	4.5	3.2	3.2	2.3	1.9	2.8	3.9	3.3	2.6	2.1	2.0	34.8
	Pacific	2.0	2.3	1.6	2.2	.9	3.4	.2	.8	.7	1.3	.7	2.2	18.0
Typho-malarial in all the regions		5.4	4.3	3.2	3.3	3.0	2.9	3.4	3.4	3.0	2.6	2.3	2.6	38.0
Intermittent, Remittent and Typho-malarial	Atlantic...	47.9	41.6	41.1	50.9	33.7	24.7	23.5	18.1	18.6	19.7	26.5	31.3	356.8
	Central....	56.1	59.4	77.9	80.7	60.9	46.1	42.5	42.0	44.1	42.1	43.4	60.9	633.9
	Pacific	16.9	26.3	34.2	20.6	17.7	14.1	9.9	7.5	9.8	13.5	12.0	15.2	196.1
All the regions		50.7	50.0	58.3	65.9	47.7	35.1	32.8	30.2	31.6	31.9	35.8	49.4	498.2

YEAR ENDING JUNE 30, 1864.

Disease.	Region.	1863.						1864.						For the year.
		July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Intermittent (including Congestive) Fever..	Atlantic...	27.6	44.7	52.0	47.8	38.8	23.5	19.4	17.1	21.0	24.2	22.2	24.5	359.7
	Central....	66.3	84.6	74.7	58.2	42.6	30.4	28.6	27.4	32.1	33.8	34.8	37.6	541.0
	Pacific	13.8	15.7	25.3	25.1	15.7	10.7	8.0	7.4	10.4	10.6	11.8	11.6	161.8
Intermittent in all the regions		51.6	69.0	65.3	54.0	40.8	27.7	25.1	23.4	27.7	29.7	30.1	32.7	470.0
Remittent Fever	Atlantic...	11.2	17.6	15.3	12.3	7.7	4.8	3.8	3.7	4.6	5.5	5.1	10.7	99.8
	Central....	19.3	21.0	15.7	10.0	7.1	4.9	5.0	5.5	6.3	7.7	9.8	13.5	123.6
	Pacific	5.0	5.1	6.8	11.3	11.6	3.6	2.7	.9	2.2	3.0	5.4	5.6	61.4
Remittent in all the regions		16.2	19.5	15.4	10.4	7.4	4.9	4.6	4.8	5.6	6.8	8.2	12.4	114.1
Intermittent and Remittent	Atlantic...	38.8	62.3	67.3	60.1	46.5	28.3	23.2	20.8	25.6	29.7	27.3	35.2	459.5
	Central....	85.6	105.6	90.4	68.2	49.7	35.3	33.6	32.9	38.4	41.5	44.6	51.1	664.6
	Pacific	18.8	20.8	32.1	36.4	27.3	14.3	10.7	8.3	12.6	13.6	17.2	17.2	223.2
Total in all the regions		67.8	88.5	80.7	64.4	48.2	32.6	29.7	28.2	33.3	36.5	38.3	45.1	584.1
Typho-malarial Fever	Atlantic...	4.4	4.2	3.0	2.8	1.8	1.2	1.3	.7	.7	.9	1.2	3.1	24.6
	Central....	2.9	3.2	1.9	1.4	1.2	.8	.6	.5	.7	.7	1.0	1.5	16.1
	Pacific	.8	.2	.3	.1	.4	.2	.2	.4	.1	.1	.2	.1	3.0
Typho-malarial in all the regions		3.4	3.5	2.3	1.9	1.4	1.0	.8	.6	.7	.7	1.0	2.0	18.9
Intermittent, Remittent and Typho-malarial	Atlantic...	43.2	66.5	70.3	62.9	48.3	29.5	24.5	21.5	26.3	30.6	28.5	38.3	484.1
	Central....	88.5	108.8	92.3	69.6	50.9	36.1	34.2	33.4	39.1	42.2	45.6	52.6	680.7
	Pacific	19.6	21.0	32.4	36.5	27.7	14.5	10.9	8.7	12.7	13.7	17.4	17.3	226.2
All the regions		71.2	92.0	83.0	66.3	49.6	33.6	30.5	28.8	34.0	37.2	39.3	47.1	603.0

Diagram showing the Monthly Ratio of Cases of Malarial Fevers among the White Troops per thousand of strength present



YEAR ENDING JUNE 30, 1865.

Disease.	Region	1864.						1865.						For the Year.
		July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Intermittent (including Congestive) Fever	Atlantic	32.9	41.5	52.[illegible]	57.[illegible]	39.[illegible]	24.[illegible]	18.6	16.6	19.6	20.0	26.9	22.0	359.3
	Central	52.8	62.9	62.[illegible]	53.8	46.[illegible]	42.5	29.7	26.3	31.3	33.6	34.1	38.1	495.8
	Pacific	[illegible].0	14.3	[illegible].[illegible]	16.4	[illegible].4	8.5	9.2	9.6	9.2	13.4	12.0	17.3	142.8
Intermittent in all the regions		42.9	50.5	57.[illegible]	[illegible].[illegible]	7.2	28.8	24.7	[illegible].6	[illegible].6	[illegible].2	22.4	[illegible].2	[illegible].7
Remittent Fever	Atlantic	17.4	17.4	16.0	13.7	9.4	6.7	6.8	5.8	6.8	6.7	7.6	9.9	119.3
	Central	18.5	22.8	15.5	10.8	8.4	7.9	7.6	7.1	8.2	8.0	9.8	11.7	137.3
	Pacific	5.4	[illegible].[illegible]	[illegible].8	[illegible].[illegible]	[illegible].[illegible]	1.[illegible]	2.6	1.9	2.6	2.4	3.8	4.1	46.9
Remittent in all the regions		[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].7	[illegible].[illegible]	7.2	6.4	7.5	7.3	8.7	10.7	127.8
Intermittent and Remittent	Atlantic	50.[illegible]	[illegible].7	68.[illegible]	[illegible].7	48.[illegible]	[illegible].[illegible]	25.4	22.4	26.4	26.7	34.5	37.9	478.6
	Central	70.[illegible]	85.2	[illegible].[illegible]	[illegible].1	55.[illegible]	49.4	37.3	33.4	39.5	41.6	43.9	49.8	633.1
	Pacific	[illegible].4	[illegible].[illegible]	[illegible].7	[illegible].7	[illegible].[illegible]	[illegible].7	11.8	11.5	11.8	15.8	15.8	21.4	189.7
Total in all the regions		[illegible].7	[illegible].4	[illegible].4	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	31.9	28.0	33.1	34.1	38.1	43.6	557.3
Typho-malarial Fever	Atlantic	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].9	1.6	1.4	1.3	1.5	1.4	1.7	1.6	34.4
	Central	[illegible].[illegible]	[illegible].[illegible]	[illegible].7	[illegible].[illegible]	.7	1.1	.8	.4	1.0	1.2	.8	1.4	14.9
	Pacific	.....	.....	.4	[illegible].[illegible]	.5	[illegible]	.4	.....	.....	.1	.....	.....	2.6
Typho-malarial in all the regions		[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].4	[illegible].[illegible]	[illegible].[illegible]	1.1	.8	1.2	1.2	1.2	1.5	22.9
Intermittent, Remittent and Typho-malarial	Atlantic	[illegible].[illegible]	[illegible].[illegible]	73.7	[illegible].7	51.4	32.9	26.8	23.7	27.9	28.1	36.2	39.5	513.0
	Central	[illegible].4	[illegible].[illegible]	80.0	65.3	44.9	41.5	38.1	33.8	40.5	42.8	44.7	51.2	648.0
	Pacific	[illegible].4	[illegible].[illegible]	17.1	25.8	13.7	9.9	12.2	11.5	11.8	15.9	15.8	21.4	193.3
All the regions		[illegible].9	[illegible].2	76.3	66.0	47.5	37.4	33.0	28.8	34.3	35.3	39.3	45.1	580.2

YEAR ENDING JUNE 30, 1866.

Disease.	Region.	1865.						1866.						For the Year.
		July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Intermittent (including Congestive) Fever	Atlantic	45.9	66.5	88.0	92.7	63.3	39.0	18.5	16.8	20.4	28.4	33.3	34.7	658.7
	Central	62.4	91.3	96.1	90.3	73.0	40.9	31.7	25.4	29.5	25.2	29.2	42.2	808.9
	Pacific	[illegible].[illegible]	23.9	42.7	41.4	37.5	22.8	12.9	7.4	12.0	18.7	18.1	21.7	285.0
Intermittent in all the regions		54.7	78.2	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	25.6	18.9	22.3	24.9	27.9	34.7	693.4
Remittent Fever	Atlantic	13.4	16.7	21.8	16.0	6.5	4.6	2.4	2.1	3.1	4.5	5.1	8.7	144.8
	Central	19.[illegible]	26.[illegible]	21.7	19.2	[illegible].[illegible]	[illegible].[illegible]	3.7	4.1	3.9	4.4	6.2	11.5	197.2
	Pacific	3.4	[illegible].5	[illegible].[illegible]	4.7	[illegible].2	[illegible].[illegible]	[illegible].3	2.5	3.2	2.5	2.6	2.3	39.0
Remittent in all the regions		16.[illegible]	[illegible].3	20.2	16.4	6.8	4.6	2.9	3.1	3.5	4.0	5.0	8.3	159.7
Intermittent and Remittent	Atlantic	[illegible].2	[illegible].2	09.8	108.7	69.8	43.6	20.9	18.9	23.5	32.9	38.4	43.4	803.5
	Central	[illegible].7	[illegible].4	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	35.2	29.5	33.4	29.6	35.4	53.7	1,006.1
	Pacific	[illegible].[illegible]	[illegible].4	[illegible].7	[illegible].[illegible]	[illegible].7	[illegible].[illegible]	15.1	9.9	15.2	21.2	20.7	24.0	324.0
Total in all the regions		[illegible].[illegible]	[illegible].5	[illegible].[illegible]	[illegible].[illegible]	[illegible].7	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	25.8	28.9	32.9	43.0	853.1
Typho-malarial Fever	Atlantic	[illegible].4	[illegible].7	[illegible].[illegible]	1.7	.5	.2	.....	.3	.....	.....	.1	.2	13.0
	Central	4.[illegible]	[illegible].7	[illegible].[illegible]	1.1	.9	.3	.1	.....	.05	.....	.1	1.2	22.5
	Pacific	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	.....	.....	.....	.1	.1	.5	1.5
Typho-malarial in all the regions		[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	.6	.2	.1	.1	.02	.05	.1	.7	16.6
Intermittent, Remittent and Typho-malarial	Atlantic	[illegible].7	[illegible].2	[illegible].[illegible]	[illegible].[illegible]	[illegible].2	[illegible].[illegible]	[illegible].2	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]
	Central	[illegible].2	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]
	Pacific	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]
All the regions		[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]

rapid and equable as the antecedent increase, the ratios for these months, 29.7 and 28.2, being very similar to those of the preceding year. The maximum was again reached, 74.4 and 73.4, in August and September, and the subsequent minimum, 28.0, in February, 1865. During the year succeeding the war the highest figures, 99.5, 108.3 and 102.0 were reached in August, September and October; the fall to the minimum, 22.0, in the following February being as sudden as was the rise which preceded it.

The intermittents had similar waves of prevalence; in fact, the contour of the general malarial waves was mainly due to the preponderance of fevers of this type. But remittents also followed the same general course, having their maximum in July, August or September,—18.1 per thousand strength in September, 1861; 19.9 in July, 1862, and 19.5, 20.6 and 21.3 in August of the three following years. The minima corresponded with January, February and March, and often included December on the one hand and April on the other; thus the average monthly ratio for these five months was 8.4 in the year 1861–2; 9.1 in 1862–3; 5.3 in 1863–4; 7.1 in 1864–5; and 3.6 in 1865–6.

It is noticeable that only in the year ending June 30, 1862, was there a distinctly marked occurrence of vernal fevers, as notable among the remittents as among the intermittents, but in both cases this vernal rise culminating in May, was separated from the autumnal increase not by a diminution in the number of febrile cases in June, but only by the failure of that month to show an increase corresponding with that of May on the one hand or July on the other. A tendency to a stasis in the advance of the febrile wave occurred also in April or May of the other years, and was most defined among the intermittents in 1864.

The great prevalence in the autumn of 1863, and again in 1865, must be considered due to the meteorological conditions of those years favoring the evolution of the disease-poison or to the operations of the troops carrying them into more dangerous localities. But these high waves were composed largely of recurrences; for the corresponding winter seasons were not characterized by that increased prevalence which would have resulted from the relapses occurring in a larger body of men subject to attack under the influence of chill, fatigue and other so-called predisposing causes. The ratios of the winter months may be regarded as giving expression to the relative numbers of men under the influence of the malarial poison in each year, for there are not wanting reports such as that of Surgeon J. M. Bates, 13th Maine Volunteers, to establish the principle that winter attacks were generally recurrences.

Every case of intermittent fever has occurred in those who were affected with the disease during last summer and fall. The attacks have shown a very general tendency to recur every seventh, fourteenth, or twenty-first day. Two companies that came from Ship Island, Mississippi, about the middle of February, have as yet given no indication of the disease, showing that the malarial influence is not sufficiently strong at this season of the year to induce the disease in those not previously affected.—*Forts Jackson & St. Philip, La., March*, 1864.

In view of this principle, it may be recognized as a fact that in October, 1862, our armies became as fully saturated with the malarial poison as in any of the after years; for while the minimum in March of that year was as low as 17.0 per thousand of strength, the succeeding minimum, which was considerably higher, did not differ much from those which followed it.

Typho-malarial fevers, which are included in the table and on the diagram, were most prevalent in the year ending June 30, 1863, diminishing gradually in the after years. The waves of prevalence were abrupt, culminating in July and falling gradually during the autumn months.

But the study of these seasonal variations for the several years may be much facilitated by their consolidation into the average figures of Table XXIX and the corresponding lines of the diagram facing page 94.

Table XXIX.

Average monthly number of Cases of the several varieties of Malarial Fever among the White Troops from July 1, 1861, to June 30, 1866, expressed as ratios per 1,000 of mean strength.

Diseases.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Annual Average.
Quotidian Intermittent	22.00	29.00	30.00	27.00	19.00	13.00	10.00	10.00	11.00	12.00	13.00	16.00	204.00
Tertian Intermittent	18.00	24.00	23.00	21.00	16.00	11.00	9.00	8.00	10.00	11.00	12.00	13.00	171.00
Quartan Intermittent	1.92	2.22	2.72	2.39	1.79	1.18	1.31	1.10	1.07	1.14	1.01	1.53	18.82
Total simple Intermittents	41.92	55.22	55.72	50.39	36.79	25.18	20.31	19.10	22.07	24.14	26.01	30.53	393.82
Congestive Fever	.82	.94	.89	.70	.47	.42	.39	.32	.32	.37	.39	.45	6.24
Total Intermittents	42.74	56.16	56.61	51.09	37.26	25.60	20.70	19.42	22.39	24.51	26.40	30.98	400.06
Remittent Fever	17.18	19.23	16.11	13.55	9.96	7.56	7.10	6.79	7.26	8.07	10.17	12.61	130.89
Total pure Malarial Fevers	59.92	75.39	72.72	64.64	47.22	33.16	27.80	26.21	29.65	32.58	36.57	43.59	530.95
Typho-malarial Fever (*a*)	4.07	3.52	2.64	2.45	1.98	1.71	1.85	1.66	1.65	1.50	1.51	2.04	26.15
Total Malarial Fevers	63.99	78.91	75.36	67.09	49.20	34.87	29.65	27.87	31.30	34.08	38.08	45.63	557.10

(*a*) From July 1, 1862, to June 30, 1866.

From these the purely malarial fevers, and the intermittents which constituted so large a proportion of them, are seen to have attained their maximum in August and September. They decreased rapidly during October and November, and slowly thereafter to their minimum in February. Their increase was slow and equable from March to June, and without any vernal wave other than that involved in the gradual formation of the autumnal increase. During July the cases occurred with greater frequency, leading to the maximum in August.

The remittents prevailed as a single annual wave, rising in March, culminating in August, and falling, more abruptly at first but more equably than the intermittents, to a minimum during the winter months.

It is noticeable also that the autumnal increase affected the intermittents and the remittents alike, *i. e.*, both of these types of fever contributed to the annual maximum of malarial fevers the same percentage of increase on their respective minima. Thus in the intermittents the difference between the minimum, 19.42, and the maximum, 56.61, is 37 19, an increase of nearly two hundred per cent. on the minimum; while the difference between the minimum, 6.79, and the maximum, 19.23, of the remittents is 12.44, also an increase of nearly two hundred per cent. on the minimum.

The seasonal curve of typho-malarial prevalence rose abruptly in June to its maximum in July, fell gradually during August, September and October, and thereafter remained at about the same level until the next June rise.

A similar table constructed from the statistics of the colored troops shows the maximum of the purely malarial fevers as having been reached in August, September and

October, after which the fall was rapid to the minimum in February. A notable increase in May, with a less marked rise in June, gives a suggestion of a vernal wave as well among the remittents as among the intermittents. The remittents, as in the case of the white troops, decreased in the autumn before a corresponding decrease occurred in the number of the accompanying agues.

The typho-malarial curve differed from that of the remittents in falling less rapidly during September and October.

Table XXX.

Average monthly number of Cases of the several varieties of Malarial Fever among the Colored Troops from July 1, 1863, to June 30, 1866, expressed in ratios per 1,000 of strength.

Diseases.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Annual Average.
Quotidian Intermittent	34.00	41.00	50.00	49.00	33.00	25.00	20.00	17.00	19.00	17.00	21.00	20.00	349.00
Tertian Intermittent	25.00	32.00	36.00	39.00	30.00	20.00	18.00	16.00	14.00	16.00	15.00	18.00	278.00
Quartan Intermittent	1.93	2.26	2.97	2.95	1.98	1.04	1.14	1.24	.91	1.53	2.01	1.50	21.39
Total simple Intermittents	60.93	75.26	88.97	90.95	64.98	46.04	39.14	34.24	33.91	34.53	38.01	39.50	648.39
Congestive Fever	1.56	1.57	1.93	1.99	.94	1.17	.85	.72	.93	.45	.88	.83	13.83
Total	62.49	76.83	90.90	92.94	65.92	47.21	39.99	34.96	34.84	34.98	38.89	40.33	662.22
Remittent Fever	23.20	23.08	21.61	17.51	12.10	8.57	7.77	7.46	8.51	9.05	13.61	15.08	167.10
Total pure Malarial Fevers	85.69	99.91	112.51	110.45	78.02	55.78	47.76	42.42	43.35	44.03	52.50	55.41	829.32
Typho-malarial Fever	6.34	6.87	6.11	4.44	1.90	1.66	1.97	1.56	2.13	1.96	2.95	3.29	41.06
Total Malarial Fevers	92.03	106.78	118.62	114.89	79.92	57.44	49.73	43.98	45.48	45.99	55.45	58.70	870.38

Seasonal Variations in Mortality.—This has been illustrated by the plate facing page 20, on which are delineated the monthly variations in the level of the malarial death-rate in juxtaposition with the corresponding variations in the mortality from certain of the more fatal classes of disease and from diseases in general. The autumnal prominences are clearly defined, particularly in the last three years, the culminating points being in August in 1863 and 1864, when 1.14 and .94 per thousand are reached, and in September, 1865, when a rate of 1.18 is shown. The autumn waves in 1861 and 1862 do not have so distinct a culmination. These death-rates will be found to correspond precisely with the variations in the line of prevalence in the diagram facing page 90; whence it may be inferred that in general these fevers caused death within the month of the attack.

Influence of Region on Prevalence.—Table XXVIII, already presented, shows the seasonal variations in prevalence as affected by the climatic and other influences of the region in which the white troops operated during the several years of the war. The malarial fevers were more frequent in the Central than in the Atlantic region, while in the Pacific region the ratio of cases was much smaller than in either of the others. During the year succeeding the war the increased prevalence of these fevers affected the troops in all the regions. In the Central and Atlantic regions this was due to the occupation of southern and malarious territory; in the Pacific region it was owing in part to the estab-

Diagrams showing the Average Annual Curves of Prevalence of the Malarial Fevers among the White and the Colored Troops during the War, in Monthly Rates per Thousand of Strength.

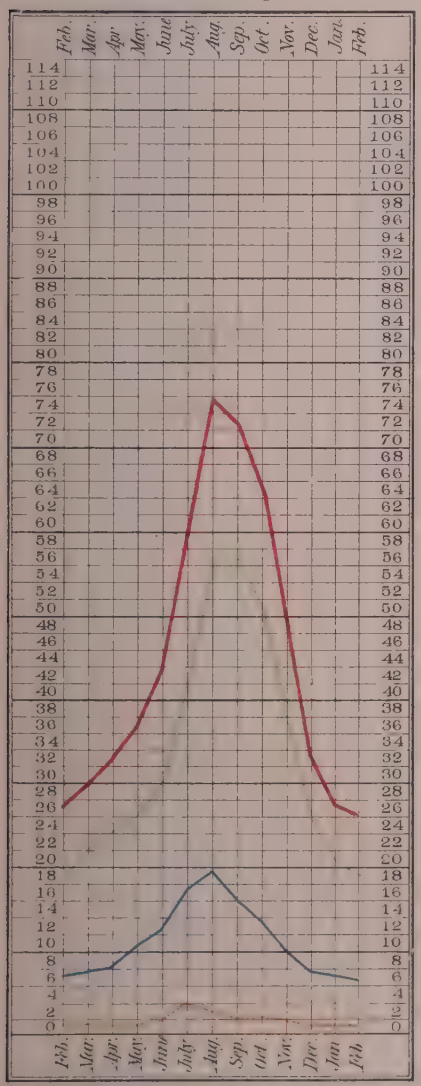
Total pure malarial fevers.

Intermittents.

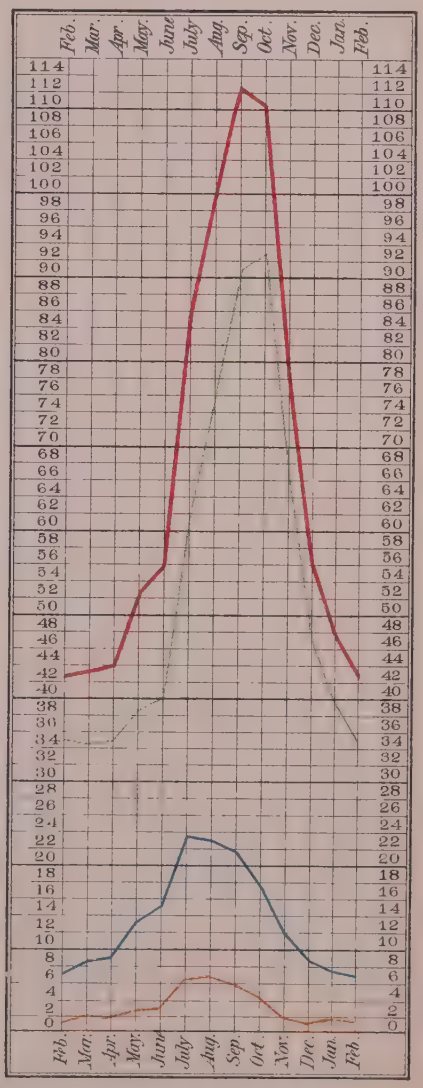
Remittents.

Typho-malarial.

White Troops.



Colored Troops.



lishment of new posts in unhealthy localities, and in part also to the introduction into this region of regular troops subject to intermittent relapses from previous service on the Southern States.

In Table XXXI the statistics of the malarial fevers among the white troops in each of the regions have been consolidated into average monthly ratios. From these, or from the accompanying diagram, it will be seen that the malarial fevers in the three regions presented a general similarity of contour. In all the minimum was reached in February and the maximum in August, September and October. A distinct vernal rise, affecting alike the remittents and the intermittents, is presented by the curves of the Pacific region.

Table XXXI.

Average monthly number of Cases of the several forms of Malarial Fever among the White Troops in the several Regions, expressed in ratios per 1,000 of strength, calculated from the cases which occurred from July 1, 1861, to June 30, 1866.

ATLANTIC REGION.

Diseases.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Annual Average.
Quotidian Intermittent	14.4	20.0	26.4	26.4	18.0	9.7	7.4	6.1	7.1	9.6	12.1	13.4	170.4
Tertian Intermittent	13.1	16.9	17.6	17.4	12.6	7.6	5.8	5.2	6.3	7.6	8.1	9.6	127.3
Quartan Intermittent	1.1	1.2	1.1	1.3	1.2	.7	.5	.4	.5	.7	.7	1.1	10.5
Congestive Intermittent	.4	.5	.7	.7	.4	.3	.3	.3	.4	.4	.4	.4	5.3
Total Intermittent	29.0	38.6	45.8	45.8	32.2	18.3	14.0	12.0	14.3	18.3	21.3	24.5	313.5
Remittent	15.8	20.7	21.4	14.9	10.1	7.4	5.4	3.7	4.8	6.7	8.4	10.4	129.8
Total pure Malarial	44.7	59.3	67.2	57.9	40.6	25.9	20.2	18.2	20.1	23.5	29.3	32.9	443.3
Typho-malarial	5.4	4.6	3.8	3.4	2.9	2.4	2.6	1.8	1.7	1.6	1.9	2.7	34.5
Total Malarial	45.5	58.3	63.4	61.6	43.4	27.3	22.2	19.6	21.5	24.9	30.2	35.0	436.4

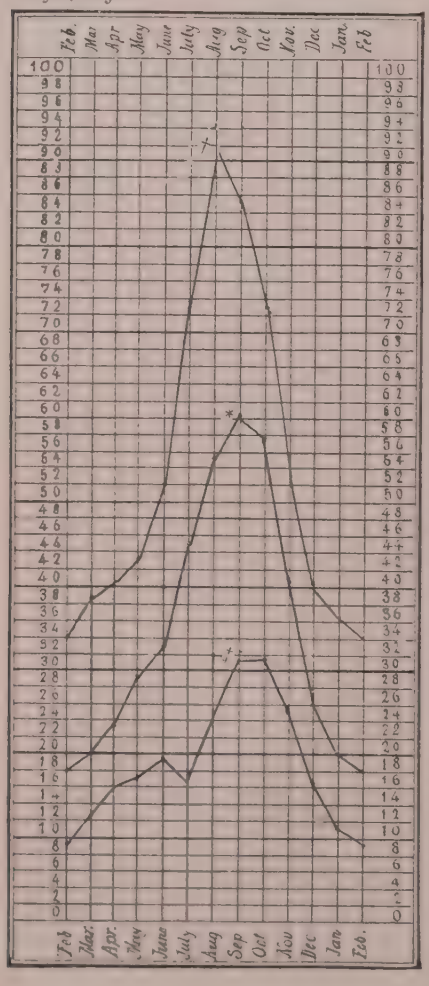
CENTRAL REGION.

Diseases.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Annual Average.
Quotidian Intermittent	28.2	40.9	35.1	30.8	21.4	16.0	13.3	12.5	14.4	15.5	15.5	19.5	250.1
Tertian Intermittent	29.1	29.4	28.2	25.3	18.6	14.4	12.7	11.5	13.6	13.6	14.5	16.1	215.6
Quartan Intermittent	2.7	3.0	2.6	2.4	1.8	1.6	2.0	1.7	1.6	1.6	1.4	1.9	25.3
Congestive Intermittent	1.4	1.6	1.4	1.1	.8	.4	.4	.4	.4	.5	.5	.6	9.0
Total Intermittent	61.4	74.9	67.3	59.6	42.6	32.4	28.4	26.1	30.0	31.2	31.9	38.1	500.0
Remittent	28.9	21.0	17.1	11.6	8.0	4.3	3.1	1.9	2.1	2.1	2.3	3.1	105.5
Total pure Malarial	90.3	95.9	84.4	71.2	50.6	36.7	31.5	28.0	32.1	33.3	34.2	41.2	605.5
Typho-malarial	6.8	5.9	4.5	3.4	3.6	2.2	2.1	1.7	1.6	1.4	1.5	1.9	36.6
Total Malarial	97.1	91.4	86.9	74.5	54.2	41.4	37.2	35.7	40.2	42.7	44.3	53.5	642.1

PACIFIC REGION.

Diseases.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Annual Average.
Quotidian Intermittent	6.8	11.9	17.2	15.5	13.8	8.9	5.6	4.9	4 7	6.7	6.7	9.4	111.5
Tertian Intermittent	4.6	5.0	6.6	7.8	5.5	3.8	2.8	2.6	4.0	4.6	4.6	4.2	55.5
Quartan Intermittent	.9	.9	.7	.6	.6	.4	.9	.4	1.0	.8	.3	1.2	8.6
Congestive Intermittent	.2	.7	.3	.2	.1	.2	.1	.1	.1	.1	.3	.2	2.6
Total Intermittent	12.5	18.5	24.8	24.1	20.0	13.3	9.4	8.0	9.8	12.2	11.9	15.0	178.2
Remittent	3.8	5.7	6.6	7.6	5.0	3.0	2.1	1.6	2.8	3.7	5.1	4.6	50.6
Total pure Malarial	16.3	24.2	31.4	31.7	25.0	16.3	11.5	9.6	12.6	15.9	17.0	19.6	228.8
Typho malarial	.8	.6	.5	.8	.5	.9	.2	.3	.2	.3	.2	.5	5.8
Total Malarial	17.0	24.7	31.8	32.4	25.4	17.0	11.5	9.9	12.7	16.2	17.1	20.1	233.7

Diagram *showing the Seasonal Prevalence of the Malarial Fevers in the Atlantic,* Central† and Pacific‡ Regions.*



The concurrence of an elevated temperature and high ratios from malarial fevers, so well marked in the seasonal variations in prevalence, is noted also in the geographical distribution of the cases. Table XXXII, which follows, exhibits an increased prevalence in the departments of the southern part of the Atlantic coast, as compared with those on the northern part of that coast. The increase from an annual rate of 144 cases per thousand of strength in the Department of the East, through the Middle and other coast departments, to 1,035 in North Carolina and 930 in the Department of the Gulf, shows in a general way the connection of these fevers with temperature as affected by latitude. In the interior their increased prevalence in the river towns, as compared with the higher ground constituting the water-shed, may be seen in the 538 cases in the Department of the Missouri, the 865 cases in the Department of Tennessee and the 1,287 cases in the Department of Arkansas, as against 227 in Western Virginia and 265 in the Department of the Ohio; while the country bordering the great lakes gave 526, as against 238 in the northwest.

In compiling this table it was found that the highest malarial sick-rate for any one year was presented by the Department of North Carolina, in which during the year 1863–4 there were recorded 23,848 cases in a strength of 10,226 men, or 2,353 cases per thousand.

TABLE XXXII.

Showing the Prevalence of Malarial Fevers in the Departments on the Eastern and Southern Coasts of the United States, and in those of the high and low grounds of the Central Region, expressed in annual ratios per 1,000 of strength, calculated from the statistics of the four years ending June 30, 1865.

	Intermittent.	Remittent.	Typho-malarial.	Total Malarial Fevers.
Department of the East	108	32	4	144
Middle Department	172	81	11	264
Department of Virginia	503	110	37	650
Department of the South	396	131	31	558
Department of North Carolina	828	179	28	1,035
Department of the Gulf	738	148	44	930
Department of West Virginia	146	71	10	227
Department of the Northwest	150	82	6	238
Department of the Ohio	187	66	12	265
Department of the Cumberland	306	135	15	456
Northern Department	386	126	14	526
Department of Missouri	390	136	12	538
Department of Tennessee	661	181	23	865
Department of Arkansas	1,103	166	18	1,287

But while the seasonal wave was made up of a proportionate increase of the intermittent and remittent cases, the increase in the number of malarial cases, which coincided with lower latitudes and lower grounds in the same latitudes, was largely composed of intermittent cases. It is evident that the 32 remittents in the Department of the East do not bear the same relation to the 108 intermittents of that command that the 166 remittents of the Department of Arkansas bear to its 1,103 intermittents. Although remittents increased in their absolute number with an increase in the total of malarial cases, their number as a percentage of that total became diminished in the more malarious localities. This is readily gathered from Table XXXIII, in which the various types of fever that occurred in each department are tabulated as percentages of the total number of its malarial cases.

At first sight it appears as if no relationship existed between the prevalence of the remittents and intermittents; for of the two departments, the East and New Mexico, which had less than 200 cases of malarial fevers annually per thousand of strength, the one had 75 per cent. of intermittents and 22 of remittents, while the other had 61 per cent. of the former and 35 of the latter. But if an examination is made of the figures from such departments as the South, the Missouri, the Northern Department and Part I of the Mississippi Division, which had an annual rate of from 500 to 600 malarial cases per thousand of strength, the intermittents will be found to have constituted from 71 to 73 per cent. of the total and the remittents from 23 to 25 per cent. It is noteworthy also, that

these figures agree with the averages from the army as a whole, for with 539 malarial cases annually per thousand of strength in all the departments the percentage of intermittents was 71.71 and that of the remittents 24.01.

TABLE XXXIII.

Showing—1, The relative prevalence of the Malarial Fevers among the White Troops in the several Departments and Regions during the four years ending June 30, 1865, expressed as ratios per 1,000 of strength; 2, The relative frequency of the forms of these Fevers, expressed in percentages of the total number of cases; and 3, The relative frequency of the varieties of Intermittent Fever, expressed as percentages of the total number of Intermittent cases.

Average annual ratio of Malarial cases per 1,000 of strength.	DEPARTMENTS AND REGIONS.	Total number of Malarial cases.	Percentage of Intermittent.	Percentage of Remittent.	Percentage of Typho-malarial.	Total number of Intermittent cases.	Percentage of Quotidians.	Percentage of Tertians.	Percentage of Quartans.	Percentage of Congestive fevers.
144	Department of the East	6,330	75.07	22.29	2.64	4,752	45.27	49.77	4.48	.48
264	Middle Department	12,275	65.04	30.56	4.47	7,984	58.20	37.04	3.31	1.45
284	Department of the Shenandoah	4,560	69.99	30.06	(a)	3,189	64.36	33.68	1.38	.60
329	Middle Military Division	15,297	64.64	30.13	5.23	9,889	52.89	43.67	2.52	.92
390	Department of Washington	40,349	62.51	26.15	11.34	25,224	47.34	47.29	4.34	1.04
315	Army of the Potomac	138,494	52.73	38.43	8.84	73,031	51.50	41.27	4.83	2.40
288	Department of the Rappahannock	4,075	53.50	46.50	(a)	2,180	43.53	47.16	6.05	3.26
650	Department of Virginia	67,249	77.43	16.90	5.68	52,068	51.33	43.48	3.85	1.34
1,035	Department of North Carolina	64,389	80.00	17.21	2.79	51,512	58.75	38.07	2.44	.74
559	Department of the South	36,175	70.82	23.50	5.68	25,619	47.73	45.56	4.77	1.94
422	Atlantic Region	389,193	65.64	27.71	6.65	255,448	52.26	42.27	3.94	1.54
238	Department of the Northwest	4,706	63.07	34.59	2.34	2,967	61.61	33.27	4.04	1.08
526	Northern Department	20,085	73.35	24.03	2.62	14,732	50.55	42.37	5.38	1.70
227	Department of West Virginia	14,075	64.19	31.22	4.59	9,035	50.08	46.00	2.78	1.14
538	Department of the Missouri	54,093	72.54	25.31	2.15	39,239	48.79	42.72	6.34	2.15
265	Department of the Ohio	22,645	70.44	25.07	4.49	15,950	52.08	42.23	4.16	1.54
456	Department of the Cumberland	107,603	67.03	29.75	3.22	72,129	52.13	41.02	5.19	1.65
865	Department of the Tennessee	211,229	76.43	20.88	2.69	161,445	51.74	41.36	5.13	1.77
595	Military Division of the Mississippi, Part I	65,004	73.46	23.44	3.10	47,756	52.53	41.15	4.93	1.39
457	Military Division of the Mississippi, Part II	40,855	70.43	27.20	2.37	28,775	50.37	44.92	3.84	.88
1,287	Department of Arkansas	73,477	85.74	12.85	1.41	62,999	49.21	43.26	6.14	1.39
930	Department of the Gulf	115,290	79.38	15.87	4.74	91,517	44.23	49.00	5.10	1.66
648	Central Region	729,062	74.97	22.00	3.03	546,544	50.03	43.18	5.19	1.62
195	Department of New Mexico	2,987	60.73	35.15	4.12	1,814	62.72	27.62	7.72	1.93
212	Department of the Pacific	5,052	77.16	20.70	2.14	3,898	59.81	33.78	5.44	.98
207	Pacific Region	8,039	71.05	26.08	2.87	5,712	60.73	31.83	6.16	1.28
539	Total in the Regions	1,126,294	71.71	24.01	4.28	807,704	50.85	42.77	4.79	1.59

(a) These departments became merged in others before the introduction of the term *typho-malarial*.

If, however, the specially malarious localities are examined, it will be found, as indicated in the presentation of Table XXXII, that the remittent fevers did not form so large

a percentage of the total as in the departments where the malarial influence was manifestly not so extensively prevalent. Thus, in the Department of Arkansas scarcely 13 per cent. of remittents occurred in 1,287 malarial cases annually per thousand of strength, in the Gulf department 16 per cent. in 930, in North Carolina 17 per cent. in 1,035 and in Tennessee 21 per cent. in 865; in the whole of the Central region 22 per cent. in 648, and in the whole of the Atlantic region 28 per cent. in 422.

In other departments, as the East, New Mexico, etc., where, with similar totals giving expression to the malarial influence, the remittents and intermittents were not similarly distributed, it is probable that the percentages of each may have been largely determined by the existence of those conditions which are recognized as predisposing causes. The highest proportion of remittents occurred in the Armies of the Potomac and Rappahannock. Predisposing causes such as fatigue, exposure to weather changes, loss of sleep, improper food, impure water, etc., were undoubtedly at their maximum among the actively engaged troops of those commands.

The typho-malarial cases, while more frequent in a malarious locality than in one comparatively free from malarial disease, do not appear to have exhibited any fixed relationship to the malarial fevers. Thus, the Department of Arkansas had the lowest percentage of typho-malarial cases, although presenting the highest annual total of malarial fevers, and the Department of Washington and Army of the Potomac gave by far the highest percentage of typho-malarial cases, although they were below the average as regards the prevalence of malarial disease.

The statements of medical authors as to the relative frequency of the types of intermittents are somewhat at variance. Thus, BROWN* represents the tertian as most frequently met with, the quartan standing next, and the quotidian as in some degree rarer than the latter. COPLAND† also gives the tertian the greatest, and the regular quotidian the least, prevalence. Climate and season have no doubt an influence on the production of these varieties. HERTZ‡ says that in temperate climates the tertian occurs most frequently, and that the short types approaching the continued form prevail in the tropics and in the temperate climates during the hot season. Indian experience appears to sustain this view. SULLIVAN§ gives the order of frequency as quotidian, tertian and quartan. MAILLOT and E. COLLIN‖ have published statistics of prevalence among the French troops in Algeria which show a similar order of frequency. Our own statistics give the following percentages: Quotidians 50.85, tertians 42.77, quartans 4.79 and congestive attacks 1.59.

On the assumption that the short types are most common in hot weather and in hot climates, quartan agues ought to be most frequent where the total of malarial disease is smallest. But the table just presented shows similar percentages of this type of fever in the Department of the East and in that of the South, in the Northern Department and in that of the Gulf, while the Department of Arkansas had many quartans and the Department of the Cumberland comparatively few. The tertians were more frequent than the quotidians in the Department of the East; but the same statement holds good with regard

* JOSEPH BROWN in the *Cyclopædia of Practical Medicine*, Phila., Pa., 1845. Vol. II, p. 206.

† *A Dictionary of Practical Medicine*, by JAMES COPLAND, London, 1858, Vol. I, p. 935.

‡ HERTZ in *Ziemssen's Cyclopædia*, Amer. Transl., New York, 1875, Vol. II, p. 595.

§ *Endemic Diseases of Tropical Climates*, by JOHN SULLIVAN, M. D., London, 1877, p. 33.

‖ F. C. MAILLOT—*Traité des Fièvres Intermittentes*, Paris, 1836—gives, on p. 414, a table showing the occurrence in the military hospitals at Bone of 2,338 clearly defined intermittents, of which 1,582 were quotidians, 730 tertians and 26 quartans. E. COLLIX—in his *Recherches sur les affections de la rate*, published in Recueil de Mémoires de Médecine, etc., 2e Série, T. IV, Paris, 1848—states, p. 116, that of 6,636 cases observed at Philippeville in Algeria, 3,523 were quotidians, 916 tertians, 78 quartans, 360 erratic or variable types and 1,759 remittents.

to the Department of the Gulf. A closer inspection of the data from which this table was made up gives greater prominence to the irregularity in this respect. While the nature of the disease-poison is no doubt the main factor in determining the type of the disease, it is probable that predisposing conditions exercise a strong influence on the resulting fever. Congestive fever constituted .48 per cent. of the intermittents in the Department of the East; .60 in the Shenandoah; .92 in the Middle Military Division, and .98 in the Department of the Pacific, in each of which the malarial total was comparatively small: 1.66 in the Department of the Gulf, and 1.39 in Arkansas, in which the totals were large; but it constituted only .74 per cent. in the highly malarious Department of North Carolina, and 1.93 in the comparatively healthy territories of the Department of New Mexico. Since, however, the highest proportionate number of congestive cases was found in the Army of the Potomac, 2.40 per cent., and in the Department of the Rappahannock, 3.26 per cent., it may be assumed, as in the case of the remittents, that these pernicious fevers were largely due to the fatigues, exposures and deprivations incident to active operations.

The distribution of the malarial fevers during the war, presented in numbers in the last two tables, has also been illustrated by the tinted map which faces this page. It is impossible to show on a single map of this, or perhaps of any size, the many changes which the exigencies of the moment necessitated in the boundaries of the various military departments. For this reason no attempt has been made to secure such official accuracy in their outlines as would be required were the map intended as an illustration of a military study. Nor is this needful, for the depth of tint indicating the prevalence of malarial fevers in a given department was determined not by the malarial character of the department as a whole, but only by that of the part, oftentimes a small one, occupied by the Union forces. The lines and circles of solid color show in what parts of the various departments our armies operated during the years of the war,—red, yellow, blue and green respectively representing the portions held during the years ending June 30, 1862, '63, '64 and '65. In certain of the home departments, as the Northern Department and those of the East and Northwest, no lines of position are given, as the troops serving in these military commands were scattered generally over the country at recruiting depots and camps of instruction, etc.

The Departments of the Rappahannock and Shenandoah and the Middle Military Division are not represented on the map. The first two temporarily formed independent commands in the section of country which was for most of the time known as the Department of the Potomac, and the last, during the latter part of the war, included West Virginia and the Valley of the Shenandoah. Nor does the Military Division of the Mississippi appear on the map. Part I of this Division included, during the last year of the war, the country composing the Departments of the Ohio, Cumberland, and Tennessee and such parts of the neighboring States as were occupied by the army under General Thomas; while Part II comprised the territory passed over by General Sherman's army in its march through Georgia to the Atlantic Coast, and thence northward to Washington, D. C.

The map shows in a general way the greater frequency of the malarial fevers in the southern portions of the Atlantic and Central regions. Apparent exceptions were due to easily explained circumstances. Thus, in the Atlantic region the troops in the Department of the South suffered less than those of the North Carolina command, because the greater portion of the former occupied during most of the war comparatively healthy sites on coast

islands. Had the fortune of war carried them into the more malarious districts, they would undoubtedly have had an experience similar to that of the rebel troops that held those districts.* Thus, also, in the Central region the depth of color expressive of prevalence is greater in the Department of Arkansas than in that of the Gulf, on account of the occupation by the troops of the unhealthy bottom lands in the former section of the country.

It would be interesting in this connection to discuss the geographical distribution of the malarial fevers among the civil population of the United States and the garrisons of our military posts in times of peace. Information on the latter head will be found in FORRY's book† and in the publications of the Surgeon General's Office.‡ As to the former, the works of DRAKE and HIRSCH § may be consulted. Both these writers have relied to a considerable extent on the military statistics compiled by FORRY and COOLIDGE.

Throughout the Atlantic region malarial fevers were, during the war, most prevalent in the swampy districts and lowlands adjoining the sea and bordering the water courses: they became milder in the dryer and more elevated districts of the interior, and disappeared in the highlands of the Appalachian chain and the mountainous districts of New England and New York; but south of Pennsylvania they were found in the river valleys at a considerable elevation.

In the Central region the malarial influence was most intense in the lowlands bordering the Gulf of Mexico and along the rivers that discharge into its waters; thence it extended northward with diminishing intensity to the vicinity of the great lakes, where it again became markedly prevalent. On the East it penetrated toward the headwaters of the streams arising in the Appalachian range, and on the West it became gradually milder towards the Rocky Mountains, finally disappearing on the lofty slopes of that system, though still existing to some extent in its elevated valleys.

In the Pacific region the relative prevalence of the malarial influence corresponded closely with that which obtained in the Atlantic region on the same isothermal lines.

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* Compare the statements of the frequency of the malarial fevers among the Confederate troops in these very districts, given in a subsequent part of this chapter, p. 105, on the authority of Dr. JOSEPH JONES. See also the testimony of KOLLOCK, cited by J. F. POSEY—*Report on the topography and epidemic diseases of the State of Georgia*, Southern Med. and Surg. Jour., Vol. XIV, 1858, p. 191—with regard to the freedom from miasmatic fevers of those sea islands on the coast of Georgia, which have "few or no brackish ponds or lagunes as compared with the opposite main." For further remarks on the medical topography of this part of the Southern States, see a reference to the report of the Confederate Surgeon SAMUEL LOGAN, *infra*, page 171.

† SAMUEL FORRY—*The Climate of the United States*, 2d Edit., New York, 1842. See also, by the same author, *Statistical Researches elucidating the Climate of the United States and its relation with diseases of Malarial origin*, etc. The Amer. Jour. of the Med. Sci., N. S., Vol. II, 1841, p. 13, and the *Endemic influences of the United States*, in the same volume, p. 293.

‡ See the *Statistical Reports on the Sickness and Mortality in the Army of the United States:* the first, *from January*, 1819, *to January*, 1839, Washington, 1840, Edit. by FORRY; the second, *from January*, 1839, *to January*, 1855, Washington, 1856, edited by R. H. COOLIDGE; the third, *from January*, 1855, *to January*, 1860, Washington, 1860, edited by the same; also the two reports edited by Assistant Surgeon (now Surgeon) J. S. BILLINGS, U. S. A., viz: *Circular No.* 4, Surgeon General's Office, Washington, Dec. 5, 1870,—*A Report on Barracks and Hospitals, with descriptions of Military Posts*, and *Circular No.* 8, Surgeon General's Office, Washington, May 1, 1875—*A Report on the Hygiene of the United States Army, with description of military posts.*

§ DANIEL DRAKE—*On the Principal Diseases of the Interior Valley of North America*, Cincinnati, 1850; also, the same work, Second series, Philadelphia, 1854. A. HIRSCH—*Handb. der historisch geographischen Pathologie*, Erlangen 1860, Bd. I, S. 11 *et seq.* See also, besides the several essays cited by HIRSCH, the following: OLIVER WENDELL HOLMES—*Facts and traditions respecting the existence of indigenous intermittent fever in New England:* being the Boylston Prize dissertation for the year 1836. Boston, 1838.—An interesting paper, giving a good deal of evidence to show that at various times during the previous century, and even earlier, intermittent fever prevailed more extensively in New England than it did at the time it was written, or indeed for a number of years previously. J. W. HEUSTIS—*Medical facts and inquiries respecting the cause, nature, prevention and cure of fever in the Southern States, etc.*, Cahawba, Alabama, 1825. R. S. HOLMES, late of the Medical Staff, U. S. Army—*On Malaria in connection with Medical Topography.* The St. Louis Med. and Surg. Jour., Vol. V, 1848, p. 519—compares the topography of certain military posts in Florida, Portland and Holton, Maine, Prairie du Chien on the Upper Mississippi, and certain points in Mexico. E. D. FENNER—*Southern Medical Reports*, New Orleans and New York, Vol. I, 1849, Vol. II, 1850. JOHN F. POSEY—*Report upon the Topography and Epidemic Diseases of the State of Georgia*, Southern Med. and Surg. Jour., Vol. XIV, 1858, pp. 106 and 191. J. C. HARRIS of Alabama—*An Essay on the climate and fevers of the Southwestern, Southern Atlantic and Gulf States.* The New Orleans Jour. of Med., Vol. XXIII, 1870, p. 401 *et seq.*; also Charleston, S. C., 1872. H. BRONSON—*History of intermittent fever in the New Haven region, with an attempt to distinguish the known from the unknown causes.* Proceedings of the Connecticut Medical Society, 2d Series, Vol. IV, 1872-5, p. 29. A. W. BARROWS—*On Malarial fever in New England.* (President's Address.) Same proceedings, 1877, p. 22. See also the *Reports on the Epidemics and Climatology* of various States, made to the Section of Meteorology, Medical Topography and Epidemic diseases, scattered through the volumes of *Transactions of the American Medical Association* prior to and including the year 1873: subsequently, many of the reports to the section of State Medicine and Public Hygiene [organized in 1873] in the same *Transactions.*

In each of these regions the malarial influence became in a general way more intense towards the south; but local conditions everywhere exercised a controlling or modifying power. Malarial fevers were less prevalent in well-drained rolling districts, elevated plateaux and mountain slopes, while they increased in frequency and severity on low plains, in moist river valleys and in swampy lands. In fact, their distribution during the war corresponded intimately with that already outlined by FORRY and COOLIDGE, and with the indications of the mortality tables of the Census Reports* and of the deaths returned by municipal boards to the National Board of Health.†

II.—MALARIAL FEVERS AMONG THE CONFEDERATE TROOPS.

Prevalence.—The consolidated monthly returns of the Confederate Army of the Potomac, preserved by Dr. T. H. WILLIAMS, have served for the computation of ratios indicating the monthly prevalence of malarial fevers in that army from July, 1861, to March, 1862, inclusive. In the table on the following page these ratios are given in juxtaposition with those for the Federal Army of the Potomac during the same months.

These figures show that malarial fevers were even more prevalent in the Confederate than in the Federal Army of the Potomac. The average monthly strength represented by the Confederate sick reports was 49,394 men, among whom occurred the monthly ratio of 38 malarial cases per thousand, while the average strength represented by the Federal sick reports was 111,169 men, and the monthly ratio of malarial cases 28.

It is not possible to contrast statistically the mortality of the two armies from these fevers during the period in question, as the Confederate returns give the number of deaths only under the heading "total from all causes."

* In this connection the following table has been compiled from the Statistics of the Census years 1870 and 1880. The figures tabulated represent deaths from malarial fevers per 100,000 living persons:

ATLANTIC REGION.	1870.	1880.	CENTRAL REGION.	1870.	1880.	PACIFIC REGION.	1870.	1880.
Rhode Island	3	1	Wisconsin	5	10	Utah	[illegible]	8
Vermont	4	9	West Virginia	6	8	Oregon	[illegible]	18
Massachusetts	4	4	Dakota	[illegible]	12	California	[illegible]	18
Connecticut	5	[illegible]	Nebraska	14	22	Nevada	[illegible]	[illegible]
Maine	6	4	Iowa	14	27	New Mexico	[illegible]	121
New Hampshire	7	5	Ohio	14	17	Washington Territory	[illegible]	11
Pennsylvania	7	9	Michigan	21	20	Arizona	[illegible]	15
New Jersey	9	29	Kentucky	25	45	Colorado	[illegible]	[illegible]
New York	[illegible]	20	Indiana	30	47	Idaho	[illegible]	15
District of Columbia	16	47	Minnesota	34	4	Montana	[illegible]	20
Delaware	18	24	Illinois	35	36	Wyoming	[illegible]	29
Maryland	[illegible]	[illegible]	Tennessee	45	59	[illegible]	[illegible]	[illegible]
Virginia	21	39	Missouri	61	83	[illegible]	[illegible]	[illegible]
North Carolina	[illegible]	[illegible]	Kansas	66	72	[illegible]	[illegible]	[illegible]
South Carolina	52	73	Alabama	76	104	[illegible]	[illegible]	[illegible]
Georgia	[illegible]	[illegible]	Mississippi	77	91	[illegible]	[illegible]	[illegible]
Florida	[illegible]	[illegible]	Arkansas	91	140	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	Texas	114	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	Louisiana	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

† See note on p. 87, *supra*.

The cases embraced in the reports of Dr. WILLIAMS consisted of 9,954 intermittents and 6,827 remittents. Of the former, 5,713 were quotidians, 3,769 tertians, 389 quartans and 83 congestive cases.

TABLE XXXIV.

A Comparison of the Prevalence of Intermittent and Remittent Fevers in the Confederate and Federal Armies of the Potomac from July 1, 1861, to March 31, 1862.

	CONFEDERATE ARMY.							U. S. ARMY.						
	MEAN STRENGTH.	Number of Cases.			Ratio per 1,000 strength.			MEAN STRENGTH.	Number of Cases.			Ratio per 1,000 strength.		
		Intermittent.	Remittent.	Total Malarial.	Intermittent.	Remittent.	Total Malarial.		Intermittent.	Remittent.	Total Malarial.	Intermittent.	Remittent.	Total Malarial.
[illegible]	[illegible]	299	330	629	14	15	29	17,709	165	63	228	9	4	13
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	23	34	67	50,608	1,607	584	2,191	32	11	43
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	30	30	60	85,408	3,514	1,340	4,854	41	16	57
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	31	23	54	113,204	3,984	1,756	5,740	35	16	51
[illegible]	[illegible]	1,005	964	2,069	26	12	38	133,669	3,011	1,922	4,933	23	14	37
[illegible]	56,700	1,148	477	1,625	20	9	29	152,759	2,151	1,474	3,625	14	10	24
[illegible]	[illegible]	697	302	949	12	5	17	167,267	1,170	982	2,152	7	6	13
[illegible]	54,810	650	171	821	12	3	15	153,368	1,344	1,148	2,492	9	7	16
[illegible]	[illegible]	488	121	609	15	4	19	126,588	793	664	1,457	7	5	12
[illegible]	[illegible]	[illegible]	759	1,965	23	15	38	111,169	1,971	1,104	3,075	18	10	28

The consolidated monthly reports for certain general hospitals in Virginia during the last four months of 1862 give, in a total of 34,890 admissions for disease, 3,095 admissions for malarial fevers distributed as follows: Remittents 931, or 30 per cent. of the malarial total, quotidians 623, tertians 1,309, quartans 215 and congestive cases 17. Unfortunately the nationality of these cannot be ascertained from the reports.

According to Dr. JONES, the reports of sick and wounded for the years 1861 and 1862, filed in the office of the Surgeon General of the Confederacy, exclusive of those from the Trans-Mississippi department, gave a total of 819,286 cases of disease and injury, not including gunshot wounds, while the cases of malarial fever numbered 115,415, or one case of malarial fever in 7.1 of the cases constituting the total. The corresponding figures* from the records of the United States troops give 1,709,416 cases of all diseases and injuries exclusive of gunshot wounds, and 274,053 cases of malarial fever, or one case in every 6.2 of the total. These rates indicate that the proportion of malarial cases to the whole number taken on sick report was greater among our men than among the Confederates. But it would be unsafe to conclude from this that the ratio of the paroxysmal fevers to epidemic was not at all less with them than with us. Indeed, in the few instances in which it has been possible to ascertain the ratios of cases to strength in certain portions of the Confederate army, they have been found to be actually greater than in the corresponding parts of the United States forces. Among the statistics preserved by Dr. JONES is a table relating to the Confederate Army of Tennessee the figures of which may be compared with those of the Federal Army of the Tennessee for the same year. The table covers fourteen

* See Table XIII, *supra*, page 31.

months, from April, 1862, to May, 1863, inclusive: but the mean strength for the first two months is unfortunately not given. Dr. Jones remarks, also, that the returns for July, September and October, 1862, are "incomplete." They represent, however, a sufficiently large part of the force to give a fair notion of the prevalence of the disease under consideration in the whole army. In the following table the malarial statistics of these armies are contrasted:

TABLE XXXV.

A Comparison of the Prevalence of Intermittent and Remittent Fevers in the Confederate and the United States Armies of the Tennessee from June 1, 1862, to May 31, 1863.

	CONFEDERATE ARMY.							U. S. ARMY.						
	MEAN STRENGTH	Number of Cases			Ratio per 1,000 strength			MEAN STRENGTH	Number of Cases			Ratio per 1,000 strength		
		Intermittent.	Remittent.	Total Malarial.	Intermittent.	Remittent.	Total Malarial.		Intermittent.	Remittent.	Total Malarial.	Intermittent.	Remittent.	Total Malarial.
June, 1862	40,675	3,269	2,487	5,756	80	61	141	66,042	2,541	1,574	4,115	38	24	62
July, 1862	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
August, 1862	30,025	2,161	1,593	3,754	72	53	125	70,997	3,245	1,725	4,970	46	24	70
September, 1862	9,311	543	97	640	58	11	69	82,972	5,898	1,702	7,600	71	21	92
October, 1862	15,082	902	230	1,132	60	15	75	111,891	7,338	1,669	9,007	65	15	80
November, 1862	33,791	1,310	268	1,578	39	8	47	136,503	6,783	1,643	8,426	50	12	62
December, 1862	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
January, 1863	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
February, 1863	63,494	2,213	613	2,826	35	9	44	141,158	4,566	1,715	6,281	32	12	44
March, 1863	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
April, 1863	64,441	3,734	1,418	5,152	58	22	80	143,367	4,695	1,736	6,431	33	12	45
May, 1863	55,121	4,030	1,498	5,528	73	27	100	140,277	3,911	1,565	5,476	28	11	39
Monthly average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

In the case of these confronting armies, as in the case of the Confederate and Federal Armies of the Potomac previously contrasted,* the Confederates had actually a larger proportion of cases than was reported by the Federal Army. Other statistics published by Dr. Jones point in the same direction. The rebel command serving in the river batteries below the city of Savannah, Ga., reported from October, 1862, to December, 1863, inclusive, a mean strength of 878 officers and men, with 3,313 malarial cases, of which 2,824 were intermittents and 489 remittents. As this command occupied the low rice lands of the Savannah river its experience may serve to indicate what our own troops in the Department of the South would have suffered had they been advanced by the fortune of war from the comparatively healthy coast islands to the lowlands of the main. Looking only to the statistics of the year 1863, Dr. Jones's figures give 2,214 intermittents and 461 remittents, a total of 2,675 cases of malarial fever in a mean strength of 873 men. In ratios per 1,000 of strength these are equivalent to 2,536 for the intermittents, 528 for the remittents and 3,064 for all the malarial fevers. Among the United States troops in the Department of the South the ratio of malarial cases for the year ending June 30, 1863,

[illegible]

was but 528, that of the intermittents being 359 and of the remittents 169; while for the following year the malarial ratio was 594, the intermittent ratio being 492 and the remittent 102.

Equally instructive is the contrast between our reports from the Department of the South and those published by JONES as from the Confederate troops serving in the Department of South Carolina, Georgia and Florida, from January, 1862, to July, 1863, inclusive. The mean strength of the command during this period was 25,723 men, and the cases of malarial fever 41,539, of which 35,925 were intermittents and 5,614 remittents. Considering only the figures for the fiscal year ending June 30, 1863, the following results are obtained, which may be compared with the ratios just stated as from the Federal Department of the South: Mean strength 26,185; number of intermittents 30,322, or 1,158 per 1,000 of strength; remittents 3,665, or 140 per 1,000; total of malarial fevers 33,987, or 1,298 per 1,000.

Another table presented by JONES embodies the statistics of the Confederate troops in and around Mobile, Ala., for the period from January, 1862, to July, 1863, inclusive: Average strength 6,752; malarial cases 13,668, of which 10,500 were intermittents and 3,168 remittents. The figures for the year ending June 30, 1863, give a mean strength of 7,659, and a total of malarial fevers amounting to 10,878, of which 8,635 were agues and 2,243 remittents. The ratios obtained from these numbers, respectively 1,420, 1,127 and 293 per 1,000 of mean strength, exceed those for the same year from our Department of the South, and even those for the same period from our more unhealthy Department of the Gulf, which reported per 1,000 of strength 863 cases of malarial fever, 696 being intermittents and 167 remittents.

The Army of the Valley of Virginia, during the ten months, January, 1862, to October, 1862, inclusive, had 3,885 malarial cases in an average strength of 15,582 men. The figures for the first six months of this period may be contrasted with those of the Federal troops in the Department of the Shenandoah. An equally trustworthy comparison cannot be made for the remaining four months, because during that period the Federal reports for the district in question have not been separately tabulated.*

* We may, however, contrast the figures furnished by Dr. JONES for the Confederate Army of the Valley of Virginia during the months of July, August, September and October, 1862, with those of the Federal troops in the Middle Department for the same period; for on the breaking up of the Department of the Shenandoah the sick reports of the troops which remained in it were consolidated with those from the Middle Department.

A Comparison of the Prevalence of Intermittent and Remittent Fevers in the Confederate Army of the Valley of Virginia and the U. S. Middle Department of the Atlantic Region for the period from July 1 to October 31, 1862.

	Confederate Army.							U. S. Army.						
	Mean Strength.	Number of Cases.			Ratio per 1,000 strength.			Mean Strength.	Number of Cases.			Ratio per 1,000 strength.		
		Intermittent.	Remittent.	Total Malarial.	Intermittent.	Remittent.	Total Malarial.		Intermittent.	Remittent.	Total Malarial.	Intermittent.	Remittent.	Total Malarial.
July, 1862	15,589	474	239	713	31	15	46	12,357	266	150	416	22	12	34
August, 1862	15,643	444	305	749	28	19	47	9,135	214	82	296	23	9	32
September, 1862	21,193	348	127	475	16	6	22	19,101	235	139	374	13	7	20
October, 1862	34,200	632	351	983	19	10	29	21,531	473	193	666	22	9	31
Monthly average	21,639	472	256	728	22	12	34	15,781	297	141	438	19	9	28

TABLE XXXVI.

A Comparison of the Prevalence of Intermittent and Remittent Fevers in the Confederate Army of Virginia and the U. S. Department of the Shenandoah from January 1, 1862, to June 30, 1862.

	CONFEDERATE ARMY.							U. S. ARMY.						
	MEAN STRENGTH.	Number of Cases.			Ratio per 1,000 strength.			MEAN STRENGTH.	Number of Cases.			Ratio per 1,000 strength.		
		Intermittent.	Remittent.	Total Malarial.	Intermittent.	Remittent.	Total Malarial.		Intermittent.	Remittent.	Total Malarial.	Intermittent.	Remittent.	Total Malarial.
January, 1862	9,278	23	13	36	3	1	4	17,143	123	85	208	7	5	12
February, 1862	8,193	16	9	25	2	1	3	21,498	155	96	251	7	5	12
March, 1862	7,418	6	7	13	1	1	2	27,437	261	127	388	9	5	14
April, 1862	9,554	31	3	34	3	31	4	14,072	181	92	273	13	6	19
May, 1862	16,731	291	48	339	17	3	20	9,508	82	50	132	9	5	14
June, 1862	18,099	310	210	520	17	12	29	14,391	177	76	253	13	5	18
Monthly average	11,545	113	48	161	10	4	14	17,341	163	88	251	9	5	14

These statistical fragments indicate that malarial fevers were more prevalent among the Confederate than among the Federal soldiers.

Mortality.—For want of data on the rebel side it is not possible to determine the relative mortality from these fevers in the opposed armies; but, as bearing on the question, we have Dr. JONES's statement that the records of the Surgeon General's Office for the years 1861 and 1862 gave 1,333 deaths in connection with 115,415 cases of paroxysmal fever and 31,238 deaths from all causes excepting gunshot injuries. Table XIII, already presented, shows that these figures are equivalent to 43 deaths from malarial fever per thousand deaths from all the included causes, and to a fatality rate of 1.15 per cent., or one death in 86.2 cases, while the corresponding figures from the records of the U. S. troops are equal to 160 deaths from malarial fever per thousand deaths from all causes, and to .95 per cent. of fatal cases, or one death in every 105.3 recorded attacks.

According to these figures the ratio of deaths to the recorded cases was greater among the rebel than among the northern troops; but there is no certainty that the recorded cases in the two armies bore the same relation to the number of cases that actually occurred. It appears not unlikely that this larger ratio of deaths to recorded cases may have originated in a failure to report the lighter agues. The familiarity of the Southern people with malarial disease suggests that many attacks which would have appeared on the sick reports, had they occurred among Northern men, may have been suffered without excuse from duty in the Confederate camps. It will be noticed, also, that the large ratio per thousand deaths from all causes constituted by the deaths from malarial fevers among the U. S. troops, as compared with the small corresponding ratio on the Confederate records, is opposed to the view that the fatality of these diseases was greater among the rebel troops.

The summary which Dr. JONES has given of the field reports from the Department of South Carolina, Georgia and Florida, is available for estimating the gravity of the malarial fevers, as he has fortunately published in connection with it a tabular consolidation of the hospital reports from that department for the same period. From these it is found that

41,589 cases of malarial fever corresponded with 227 deaths, or one death in every 187 cases, constituting a smaller percentage of fatal cases .55, in this malarious department than the average percentage, .76* among the Union troops in all the departments.

The opinion that the rate of lethality of the malarial fevers as a class was smaller among the Confederates than among the Union troops gathers support from a study of the totals in the following table, which show that the percentages of the different types of fever were not the same in the two armies:

Table XXXVII.

Showing—1, The Relative Frequency of the Forms of Malarial Fever among the Confederate Troops as compared with their Frequency among the Troops of the United States, expressed in percentages of the total number of Malarial Cases; and, 2, The Frequency of the Varieties of the Intermittents, expressed in percentages of their totals.

Command.	Period under Observation.	Total number of Malarial Fevers.	Intermittent as per cent. of Total.	Remittent as per cent. of Total.	Total number of Intermittents.	Percentage of Total Intermittents.			
						Quotidian.	Tertian.	Quartan.	Congestive.
[illegible] Savannah, Ga. ..... Confed.	Oct., '62, to Dec., '63, 15 months.	3,333	85	15	2,824	47	51	1	.07
Department of the South ..... U. S.		17,321	73	22	13,966	53	45	6	1.00
Department of South Carolina, Georgia and Florida ..... Confed.	Jan., '62, to July, '63, 19 months.	41,539	86	14	35,925	50	47	3	.50
Department of the South ..... U. S.		14,825	69	31	10,294	53	39	6	2.00
[illegible] ..... Confed.	Jan., '62, to July, '63, 19 months.	13,949	77	23	10,772	36	60	3	.80
Department of the Gulf ..... U. S.		26,753	81	19	21,676	43	52	5	2.00
Army of Tennessee ..... Confed.	April, '62, to May, '63, 14 months.	40,133	70	30	28,089	47	45	6	2.00
Department of the Tennessee ..... U. S.		54,563	73	27	67,366	50	42	6	2.00
Army of Virginia ..... Confed.	Jan. to Oct., 1862, 10 months.	3,886	66	34	2,573	46	45	7	2.00
Department of the Shenandoah, Middle Department ..... U. S.		3,257	67	33	2,067	62	33	4	1.00
Army of the Potomac ..... Confed.	July, '61, to Mar., '62, 9 months.	16,781	59	41	9,964	57	38	4	.00
Army of the Potomac ..... U. S.		27,672	64	36	17,739	50	40	5	5.00
Total Confed. troops		119,621	78	21	90,147	48	47	4	.70
Total U. S. troops		144,391	74	26	107,108	49	42	7	2.00

The remittents, for instance, constituted a larger proportion of the malarial cases among the Union than among the Confederate troops. It must be remembered, also, that only the remittents and intermittents occurring in the Federal forces are here tabulated, the typho-malarial cases having been omitted as the Confederate reports had no corresponding headings. No doubt some of our typho-malarial cases, had they been in the hands of southern officers, would have been reported among the remittent fevers, as some of the remittents of the Confederate surgeons might, on account of a dry dark tongue or other symptoms, have been called typho-malarial had they occurred in the practice of northern medical men. It may therefore be assumed that if the same medical views had determined the diagnosis of all the cases tabulated above the difference between the percentages of remittents in the two armies would have been greater. Had the diagnosis been made by our northern medical men the remittents of the Confederate army would have been consid-

* Table XXII. *supra*, p. 79.

ished by the abstraction of a certain number of typho-malarial cases, while, had the southern officers made the record, the remittents of our army would have been increased in the absence of the typho-malarial group. On either supposition the preponderance of grave cases of malarial fever, shown by the table as having existed among the Union troops, would have been augmented. The greater percentage of congestive cases among our troops is also suggestive of a larger mortality. Indeed, these percentages may be used to determine approximately the average gravity of the malarial fevers among the Confederate troops. If it be admitted that the various types of paroxysmal fever, as they occurred among the Confederates, were attended by the mortality which characterized them in their attacks upon our soldiers, as shown in the last column of Table XXII,* the influence exercised on the mortality by the smaller proportion of remittent and congestive cases among them may be estimated. The deaths thus calculated formed .57 per cent. of the cases,† or one death in every 175 cases among the Confederate troops, and .97 per cent., or one death in every 103 cases that occurred among the United States soldiers for the periods stated in the table above presented. It seems probable, therefore, that although attacks of malarial fever were of more frequent occurrence among the Confederates, the gravity of these attacks, including the consequent mortality, was less than among the Union troops.

III.—MALARIAL FEVERS AMONG THE PRISONERS OF WAR HELD BY THE REBEL AUTHORITIES.

It might reasonably be supposed, from the situation of the principal places of confinement, that malarial fevers of local origin would not have prevailed so largely among our captured men as among our troops on active service; but the statistics bearing on this question are not of a satisfactory character.

Dr. JONES has endeavored to show that the Federal prisoners in the Andersonville stockade suffered less from these fevers than the rebel troops serving in South Carolina, Georgia and Florida, or even in such an elevated and comparatively healthy region as the Valley of Virginia.‡ A reference to Table XVI,§ compiled from figures published by him, will show that during the six months of 1864, March to August inclusive, there were reported among the prisoners 2,966 cases of malarial fever, 119 of which were fatal. Of the cases 1,170 were quotidians, 775 tertians, 195 quartans, 8 congestive fevers and 818 remittents. The intermittents caused 64 deaths and the remittents 55. The monthly ratio of cases per thousand of strength was 23, a number considerably smaller than the average monthly ratio among our white troops in the Atlantic region for the months stated, as may be seen by a reference to Table XXVIII.‖ Dr. JONES, however, recognized the

* See page 79, *supra*.

† In every hundred cases of pure malarial fever there were—

Among the Union Troops.		Among the Confederate Troops.	
35.8 Quotidians with	.0358 deaths.	36.0 cases with	.036 deaths.
31.4 Tertians with	.0314 deaths.	35.3 cases with	.0352 deaths.
3.6 Quartans with	.0073 deaths.	3.0 cases with	.0060 deaths.
2.2 Congestive with	.5398 deaths.	0.7 cases with	.1664 deaths.
27.0 Remittents with	.3537 deaths.	25.0 cases with	.3275 deaths.
100.0 Malarial with	.9680 deaths.	100.0 cases with	.5711 deaths.

‡ See his *Investigations upon the diseases of the Federal Prisoners*, etc., cited in note, page 29, *supra*.

§ Page 35, *supra*.

‖ Pages 89, 90 and 91, *supra*.

fact that his figures did not embrace the whole number of cases that occurred within the stockade during the six months.* Their deficiency may be appreciated by an examination of the original hospital register of the prison, now on file in the office of the Adjutant-General of the Army. This document shows the number of deaths caused by these fevers between February 24, 1864, and April 17, 1865, to have been 163, of which 147 occurred during the period covered by JONES' compilation, being 30 in excess of those reported by him.

But the register throws no direct light on the number of cases. Only a small minority of the malarial fevers occurring among the prisoners in the stockade were admitted to hospital. While Dr. JONES' statement embraces 2,966 cases in a period of six months, the hospital register acknowledges the admission of only 254 cases in a period of over fourteen months, which included the six months aforesaid. The character of the admitted cases may be inferred from the fact that 163 of their number terminated fatally. There were 160 intermittents with 101 deaths, 88 remittents with 59 deaths, and 6 congestive cases with 3 deaths: in 13 of the cases no disposition is recorded.†

Dr. JONES has pointed out that after a considerable increase in the prevalence of the malarial fevers among the prisoners during the month of May, when the mortuary ratio of 77 per thousand was attained, the cases thereafter diminished to a ratio of 17 per thousand in July and 15 in August. Although the figures which he has published have no absolute value, it is probable that they give a fair expression to the relative prevalence at different times, especially as confirmatory evidence is obtained from the mortality as recorded in the hospital register, which shows 149 deaths from malarial fevers during the six months ending August 3, 1864, and but 14 deaths during the subsequent eight months. In explanation of this, he has suggested that the morbific influences generated by the overcrowded and filthy condition of the stockade neutralized or destroyed the malarial poison,‡ and in view of the well-known infrequency of malarial fevers in densely peopled cities this suggestion appears probable enough.

The only other statistics bearing on the prevalence of malarial fevers among Federal prisoners in the South are from the register of Division No. 2 of the hospital at Danville, Va. This record extends from November 23, 1863, to March 27, 1865. There were 4,332 admissions and 1,084 deaths, of which but 233 cases and 17 deaths are attributed to malarial fevers. Such figures suggest similar conditions, so far as concerns the occurrence of these fevers, to those which existed at Andersonville.

IV.—MALARIAL FEVERS AMONG THE PRISONERS OF WAR HELD BY THE UNITED STATES.

The alphabetical registers of the Surgeon-General's Office record the deaths of 1,134 Confederate prisoners from malarial fevers in a total of 23,591 deaths from all diseases: of these 122 were attributed to simple intermittents, 160 to congestives, 482 to remittent and 351 to typho-malarial fever. These figures afford no basis for calculating the relative

* He remarks, in speaking generally of the statistics of the Andersonville prisoners,—"No hospital record of the sick in the stockade can be found after the establishment of the hospital without the pens. This fact, in connection with their limited personal contact, owing to the inefficiency of medical officers, and the extreme illness, and even death, of many of the prisoners in the tents in the stockade without any medical attention or record beyond the bare number of the dead, demonstrate that the figures, large as they appear to be, are far below the truth." P. 559, *op. cit.* When, however, he comes to discuss the frequency of malarial fevers among these prisoners, he takes a somewhat modified view: "While it is evident from the results of the examinations recorded in the fourth chapter [post-mortem examinations] that the errors were greater in this class of diseases than in the others, and in fact, from the nature of malarial fever, we should be disposed to consider them less." P. 566, *op. cit.* On the contrary, it would seem that in an establishment where the medical attendance was insufficient, as at Andersonville, such comparatively mild forms of disease as ordinary intermittent fever would have been most likely to escape report.

† See Table XV, p. 34, *supra.* ‡ *Op. cit.*, p. 568.

frequency or fatality of malarial disease among the prisoners; but the following table, compiled from the monthly reports of sick and wounded from the principal prison depots, is of value in this connection:

TABLE XXXVIII.

Cases of Malarial Fever with resulting mortality, reported from the principal Prison Depôts as having occurred among the Confederate Prisoners of War; with the annual ratios per thousand of strength present.

	Camp Douglas, Ill., Feb., 1862—June, 1865.	Alton, Ill., Sept., 1862—June, 1865.	Rock Island, Ill., Feb., 1864—June, 1865.	Camp Morton, Ind., June, 1863—June, 1865.	Johnson's Island, Ohio, June, 1863—June, 1865.	Camp Chase, Ohio, Feb., 1864—June, 1865.	Elmira, New York, July, 1864—June, 1865.	Fort Delaware, Del., Aug., 1863—June, 1865.	Point Lookout, Md., Sept., 1863—June, 1865.	Total in the nine Prison Depôts.
Average number of prisoners present	5,361	1,008	6,030	2,865	2,114	3,570	6,591	6,406	9,610	40,815
Intermittent cases	5,864	5,234	1,365	1,032	228	2,527	321	2,498	5,209	24,278
Remittent cases	4,124	1,250	1,009	416	135	1,728	305	653	1,620	11,240
Typho-malarial cases	163	722	10	506	54	3	2	1,574	35	3,069
Total Malarial Fevers	10,151	7,206	2,384	1,954	417	4,258	628	4,725	6,864	38,587
Deaths from Intermittents	48	30	17	12	3	14	5	27	57	213
Deaths from Remittents	134	25	23	9	3	11	59	57	103	424
Deaths from Typho-malarial	51	122	12	98	4	9	1	91	1	389
Total deaths from Malarial Fevers	233	177	52	119	10	34	65	175	161	1,026
Annual ratios per thousand of strength for cases of—										
Intermittent Fever	320.5	1,832.9	159.8	172.9	51.8	499.7	48.7	203.5	295.4	297.1
Remittent Fever	225.4	437.9	118.1	69.7	30.7	341.7	46.3	53.2	91.9	137.7
Typho-malarial Fever	8.9	252.9	1.2	84.8	12.2	.6	.3	128.2	2.0	37.6
All Malarial Fevers	554.8	2,523.7	279.1	327.4	94.7	842.0	95.3	384.9	389.3	472.7
Annual ratios per thousand of strength for deaths from—										
Intermittent Fever	2.6	10.5	2.0	2.0	.7	2.7	.8	2.2	3.3	2.6
Remittent Fever	7.3	8.8	2.7	1.5	.7	2.2	8.9	4.6	5.9	5.2
Typho-malarial Fever	2.8	42.7	1.4	16.4	.9	1.8	.2	7.4	.0	4.8
All Malarial Fevers	12.7	62.0	6.1	19.9	2.3	6.7	9.9	14.2	9.2	12.6

The ratio of cases to strength at Johnson's Island and Elmira was very small; at Rock Island and Camp Morton it was less, and at Camps Chase and Douglas more, than the ratio for the United States troops in the Northern Department—526 per thousand annually. At Fort Delaware and Point Lookout the ratios were somewhat less than that furnished by our own troops in the Department of Washington—390 per thousand. Only at Alton, Illinois, was the ratio such as to suggest the existence of intense local malarial influences. Here the proportion of cases was greater than in any part of our army except the Department of North Carolina during the third year of the war.* But when the facts relating to the frequent changes in the individuals composing the average number present at this post are understood,† the large rates may be accounted for without assuming the

* See *supra*, p. 96.

† See *supra*, p. 62.

existence of malarial influences of local origin and rendered the prison, according to the reports of the inspectors, was on a dry, elevated and generally healthy site.

The deaths from the purely malarial fevers in our army, as shown by Table XXVI were 3.36 per thousand of strength annually or, including the deaths from typho-malarial fever 5.04 per thousand. These figures are exceeded by the mortality rates of all the prisons except Johnson's Island. On the other hand the annual mortality rate among our colored troops, 10.03 for the purely malarial fevers or 16.82 including the typho-malarial group, was considerably greater than the average of the prison rates, 7.8 for the pure malarial fevers or 12.6 inclusive of the typho-malarial cases.

The extent to which these fevers prevailed among the Confederate armies renders it probable that many of the cases that occurred among the prisoners were recurrences of a disease contracted in the field before their capture.

II.—CLINICAL RECORDS OF MALARIAL DISEASE.

The clinical records of the war contain but few cases of malarial disease and these, as a rule, are exceedingly meagre in details seldom going more than to identification of the patient and a statement of the diagnosis, treatment and result. A description of the symptoms as they varied from day to day in the progress of the fever, or as influenced by remedies, was rarely attempted. But a word or two occasionally introduced indicating determination of the constitution, length of time during which the disease had been in progress, or the existence of notable complications, give an interest to the records by impressing an individuality on many of the cases.

The absence of details is not surprising, in view of the great prevalence of malarial fevers. Disease which is of daily occurrence is not usually noted by the profession unless presenting some difference in its symptoms from those generally accepted as characteristic. Thus, from the very absence of records it may be concluded that the intermittents, remittents and congestive fevers which were so prevalent in our armies, presented little to distinguish them from the same diseases as observed by our medical men in their practice before the war.

Moreover, intermittent cases were mainly treated in the field where medical officers had few facilities for note taking. Intermittents seldom got farther away from active service than the hospitals at the base of supplies except by furlough during convalescence, for death, removal from the violence of the malarial agency, or a cure was effected by specific medication, during the period occupied by treatment in the field or at these base hospitals. The temporary character of the latter and their liability to be at any time crowded with wounded from the field of battle constitute a sufficient explanation of the paucity of clinical histories among their records. It was only at the general hospitals, the permanent establishments situated at a distance from the conflicting armies, that clinical records of disease were kept, and malarial cases admitted there exhibited the results of those changes in the constitution, or as complicating other diseases having a lengthened course, such as diarrhœa or typhoid fever.

The following cases may not therefore be considered as illustrating malarial diseases under their ordinary aspects, but as presenting certain exceptional features which led

to their being recorded, the exceptional feature in some instances consisting of nothing more remarkable than the presence of the case in the wards of a general hospital in which clinical records were kept with more or less regularity. Nevertheless, most of the cases may be taken as typical of a class or series, for it seems unlikely that any one of them would have been unique if the records of the whole vast number of cases had been preserved.

A quotidian intermittent.—Case 1.—Private Patrick Shehan, Co. H, 146th Ill. Vols., was admitted September 23, 1864, with quotidian intermittent fever. Quinine was given every four hours for three or four days, and afterwards vegetable tonics. He was furloughed November 1, and on his return on the 18th was sent to his command for duty.—*General Hospital, Quincy, Ill.*

A quotidian with relapses.—Case 2.—Private J. M. Hinchee, Co. K, 33d Ill. Vols.; age 19; was admitted October 12, 1863, having been affected with intermittent fever since September 19. On the 18th he had a chill, for which eight grains of quinine were given in divided doses. The chill returned daily until the 21st. It recurred on November 3, and again on the 15th, but by continuing the quinine no further relapse took place up to December 8, when he was returned to duty.—*General Hospital, Quincy, Ill.*

A tertian with relapses attributed to over-eating, &c.—Case 3.—Private Anthony Monsieur, Co. C, 13th Ill. Cav.; age 30; was admitted August 19, 1863, with tertian ague. His skin was sallow, conjunctivæ yellowish, tongue coated, bowels loose, pulse full and strong. Quinine, blue-pill and opium were given, and when the paroxysms were checked, strychnia was administered. He improved rapidly under this treatment, but as he was given to excesses in eating and drinking, several relapses occurred. He was ultimately returned to duty with his regiment October 13, 1863.—*General Hospital, Quincy, Ill.*

A quartan with slow recovery after several relapses.—Case 4.—Private James Wright, Co. F, 21st Ill. Vols.; age 21; was admitted September 25, 1863, having a chill every third day. His skin was sallow, tongue coated and bowels loose. Strychnia, blue-pill and capsicum were prescribed. He improved slowly, suffering several relapses; ultimately Fowler's solution proved effectual and the patient was returned to duty February 14, 1864.—*General Hospital, Quincy, Ill.*

Debility from recurring attacks of ague.—Case 5.—Private William Lambert, Co. G, 19th Mass. Vols., a feeble-looking boy, was admitted October 10, 1861, much prostrated from repeated attacks of ague. He had one paroxysm after admission. He took fifteen grains of quinine at once and three grains three times a day afterwards. He was confined to bed by weakness for some time; but after this, when able to walk out a little, his improvement was more rapid. He was returned to duty on November 29.—*Regimental Hospital 19th Mass. Vols.*

Case 6.—Private George Frazer, Co. D, 7th Va. Vols.; age 20; was admitted May 23, 1865, from Lincoln Hospital, Washington, D. C. He had contracted intermittent fever in March in the pine swamps at Humphrey's station before Petersburg, Va. On admission he was very weak and anæmic. Fowler's solution in five-drop doses was given three times a day until the 31st. On June 7 he was placed on hospital-guard duty, and on July 12 was returned to duty with his command.—*Satterlee Hospital, Philadelphia, Pa.*

Case 7.—Corporal Jno. W. Moore, Co. K, 13th Iowa Vols.; age 24; was admitted Sept. 23, 1863, with debility from intermittent fever. He was placed on duty in the ward as he had no chills, and his tongue was clean and appetite good. Quinine and iron were prescribed. About October 20 he had a rigor with high fever every few days. Quinine and strychnia were given. On November 20 the chills continued, and there was some diarrhœa, for which nitrate of silver and opium were ordered. By December 25 he was gaining strength slowly. The diarrhœa was checked by January 10, 1864, but the chills continued. Fowler's solution was given. He was returned to duty March 22.—*General Hospital, Quincy, Ill.*

Cases complicated with diarrhœa and dysentery.—Case 8.—Private Dennis O'Brien, Co. C, 56th Ill. Vols.; age 37; was admitted October 11, 1862, with intermittent fever and diarrhœa, with which he had been affected since September 29. He was treated with quinine, blue-pill, opium and turpentine emulsion. He improved steadily and was returned to duty on the 27th.—*General Hospital, Quincy, Ill.*

Case 9.—Private Frank Gad, Co. A, 84th Ill. Vols.; age 17; was admitted Sept. 18, 1864, having been sick for two weeks with quotidian intermittent and dysentery, the paroxysms occurring about 3 P. M. The bowels were loose and the tongue coated white. Five grains of quinine with three of Dover's powder were given every three hours. A relapse occurred on October 9. The patient was returned to duty October 27.—*General Hospital, Quincy, Ill.*

Case 10.—Private Thomas L. Dixie, recently discharged from Co. A, 38th Iowa Vols., was admitted August 29, 1863, much prostrated by chills and fever and a diarrhœa of ten or twelve stools daily, from which he had suffered since July 3. The diarrhœa and chills were checked on September 4, and his appetite improved. He went home on the 8th.—*Union Hospital, Memphis, Tenn.*

Ague with diarrhœa, anæmia and enlarged spleen.—Case 11.—Private James J. Wolfe, Co. G, 10th Ill. Cav., was admitted August 30, 1863, with intermittent fever and diarrhœa. He had been subject to diarrhœa for more than a year, but the ague dated only from July 1. On admission he was emaciated and anæmic; he had some diarrhœa, a short hacking cough, a weak pulse, 95, an anxious countenance, a systolic cardiac murmur and a spleen which extended three inches below the false ribs; he had, however, a good appetite. He gained strength and ultimately, on October 23, was returned to duty.—*Union Hospital, Memphis, Tenn.*

Ague with diarrhœa and debility; slow recovery.—Case 12.—Private Jno. J. Hand, Co. E, 127th Ill. Vols.; age 21; was admitted September 28, 1863, with intermittent fever. He had a chill every day followed by high fever: he had also dyspnœa and pain in the hypochondrium: tongue covered with a white fur: appetite moderate. Quinine and tincture of iron were prescribed. Diarrhœa supervened on October 10, and was treated by nitrate of silver and opium; the aguish paroxysms continued to recur. At the beginning of November he was furloughed for two weeks. At the end of the month he was much debilitated, having from three to five discharges from the bowels daily. In December one-sixteenth of a grain of strychnia was given three times a day. Improvement was very slow. He was not returned to duty until March 9.—*General Hospital, Quincy, Ill.*

Ague followed by dysentery.—Case 13.—Horace Hastings, drummer, Co. E, 19th Mass. Vols., was admitted on November 2, 1861, with quotidian intermittent. One fifteen-grain dose of quinine was given, followed by five grains three times a day. The chills were suppressed, but the patient had some bloody and painful discharges from the bowels. While taking Dover's powder and acetate of lead the passages became reduced to two daily, but were accompanied with much pain, protrusion of the rectum and free hæmorrhage; he had also some tenderness in the epigastric region, which was relieved by sinapisms. The tongue became clean and the diarrhœa checked on November 14, and the patient was returned to quarters on the 16th.—*Regimental Hospital 19th Mass.*

Ague protracted and complicated with jaundice.—Case 14.—Private James J. Ray, Co. I, 10th Wis. Vols.; age 26; was admitted March 3, 1863, emaciated, feeble and jaundiced, with a thickly coated tongue, small appetite and very rapid pulse. He had been taken with intermittent fever in August, 1862, and had done no duty since that time. After his admission he was attacked with excruciating pains in the bowels. He was treated with gelsemium, taraxacum, iodide of potassium and extract of cinchona. He improved rapidly, gaining in flesh and strength, and was returned to duty August 31, 1863.—*General Hospital, Quincy, Ill.*

Ague followed by jaundice and diarrhœa.—Case 15.—Sergeant Charles Legrist, Co. E, 35th Mo. Vols., had an attack of intermittent fever early in August, 1863: jaundice and diarrhœa supervened. He was admitted October 1 with increasing debility and a diarrhœa of twelve stools daily. He failed rapidly and died on the 10th.—*Union Hospital, Memphis, Tenn.*

Protracted ague followed by carbuncle.—Case 16.—Private A. Lydick, Co. D, 78th Pa. Vols.; age 44; was admitted March 10, 1863, having been unfit for duty on account of intermittent fever since August, 1862. At the date of admission he was feverish and had on his back a large and painful carbuncle. Tonics were given and creasote dressing applied. In healing, the carbuncle left him stooped very much, and the cicatrix was very tender. He was transferred November 25 to the 27th Company, 2d Battalion, Invalid Corps.—*General Hospital, Quincy, Ill.*

Protracted ague followed by ulcers of leg.—Case 17.—Private John Hogan, Co. E, 119th Ill. Vols.; age 23; was admitted August 10, 1863. This patient had intermittent fever from May, 1862, to March 9, 1863, when the chills ceased with the appearance of a sore upon his left leg. On admission his leg was swollen, red and firm, presenting between the ankle and the upper third many open suppurating sores. Under the use of iodide of potassium, rest and bandages, he improved. In January, 1863, having overstayed a pass he was reported as a deserter, and on his return was transferred to the care of the provost marshal.—*General Hospital, Quincy, Ill.*

Ague with consumption supervening.—Case 18.—Private M. E. Williams, Co. A, 87th Ill. Vols.; age 26; admitted August 20, 1863. This man was taken with intermittent fever in November, 1862, and did no duty from that time. On admission he complained of pain in left subclavicular region, where there was dulness on percussion; his respiration was hurried and difficult, pulse frequent; he had hectic fever, night-sweats and colliquative diarrhœa. Cod-liver oil, porter, quinine and aromatic sulphuric acid were employed in the treatment. Afterwards he improved somewhat while taking syrup of wild cherry. On November 11 he was transferred to Cincinnati for discharge.—*General Hospital, Quincy, Ill.*

Tertian becoming quotidian and afterwards remittent.—Case 19.—Lieutenant H. M. Rideout, 10th U. S. Art'y, was admitted November 3, 1863. He had been attacked ten days before with a severe chill, followed by fever and headache; two days after this he had a second chill with fever and some delirium. The fever was accompanied with much pain in the back, anorexia, gastric irritation, prostration and constipation. The chill recurred daily during the next three days. After the fifth chill there had been only imperfect remissions of the fever. The patient had been on duty for eight months in the low swampy lands of Louisiana. On admission his pulse was 120 and skin hot, dry and pallid. Ten grains of blue pill were given, and quinine and capsicum ordered every three hours. Under this treatment the fever abated and there was no recurrence of the chills. On November 9 there was slight fever, the pulse 96 and somewhat corded, but this condition lasted only a few hours. He was returned to duty on the 30th.—*Hospital, Natchez, Miss.*

Intermittents becoming remittent.—Case 20.—Sergeant John L. Hopper, Co. I, 119th Ill. Vols.; age 28; was admitted October 31, 1862, with remittent fever, having been sick for four days with intermittent fever. On admission the tongue was clean but red at the tip, pulse 96, skin hot but moist, bowels loose; the patient complained of much thirst and pain in the back and stomach. He was treated with quinine and aromatic powder, morphia and carbonate of soda. Medication was stopped on November 4, and he was returned to duty on December 1.—*General Hospital, Quincy, Ill.*

Case 21.—Sergeant Jas. M. Price, Co. G, 26th Mich. Vols.; age 31; while en route with his regiment for New York City on account of the draft riots, was taken, while in Washington, D. C., July 13, 1863, with intermittent fever, which recurred daily. On admission on the 18th he was much prostrated, having just passed the sweating stage of that day's paroxysm. One grain of quinine was prescribed for administration every hour until symptoms

of cinchonism were produced. He took eleven grains, and next day the skin was hot and dry, the tongue coated, and the urine high colored and scanty; towards noon there was a remission. On the 21st the disease was distinctly remittent. Quinine was given during the remissions and acetate of ammonia during the exacerbations. In a day or two the fever ceased and did not recur, but the patient was quite feeble, anæmic and without appetite. On the 28th he stayed up dressed for a short time. Tincture of iron was given. He was returned to duty on September 7.—*Act. Ass't Surg. G. M. Smith, U. S. Army, Ladies' Home Hospital, New York City.*

Intermittent fever becoming continued and accompanied with diarrhœa.—CASE 22.—Private Orlando Wood, General Steel's escort, taken sick with intermittent fever, followed by a continued fever and diarrhœa after recurrences of the intermittent, was admitted October 11, 1862. He was very sallow. Quinine, blue pill and opium were given for the fever and turpentine emulsion for the diarrhœa. The patient improved rapidly from his entry into hospital, and was discharged on the 28th on account of an old fracture of the femur.—*Hospital, Quincy, Ill.*

Intermittent followed by typhoid fever.—CASE 23.—Private O. S. Raymond, Co. F, 28th Wis. Vols.; age 19; was admitted June 21, 1863, with typhoid fever. He was attacked with intermittent fever June 1, while in camp at Helena, and the fever assuming a typhoid type, he was removed to this hospital. On admission his tongue was dry and brown, the edges and tip red; pulse 85; skin dry and harsh; bowels irritable and tympanitic. He was furloughed August 19 and returned to duty September 11.—*Lawson Hospital, St. Louis, Mo.*

Cases of remittent fever.—CASE 24.—Private George Vaden, Co. B, 24th Tenn.; age 20; was admitted November 6, 1864, with remittent fever, having been sick for six days before admission. Quinine, capsicum and morphia were given. He had no fever in the morning after the 7th, but every evening up to the 16th, some febrile action was manifested, and the tongue remained more or less furred. Blue pill and Epsom salts were given on the 9th. Cough was troublesome on the 10th, and muriate of ammonia, ipecacuanha and opium were prescribed. After this, quinine, Dover's powder and capsicum were given, and a blister applied on the 15th. He was returned to duty on the 28th. —*Hospital, Rock Island, Ill.*

CASE 25.—Private E. W. Kirkland, Co. H, 4th Ala. Cav.; age 30; was admitted November 8, 1864, with remittent fever. He had been sick for eight days prior to his admission. When admitted he was greatly debilitated, but had no fever, which, however, returned at night for some time. Three grains each of quinine and Dover's powder, with one grain of capsicum, were given every three hours. Blue pill and Epsom salts were prescribed on the 10th, as the bowels were constipated and the tongue much furred. There was great irritability of stomach on the 13th. The quinine was combined with carbonate of ammonia and camphor, and whiskey was given. A blister was applied on the 16th, on account of pain in the left side. Treatment was continued until December 6. The patient was returned to duty on the 10th.—*Hospital, Rock Island, Ill.*

CASE 26.—Private Wm. R. Kimball, 2d Batt. V. R. C.; age 41; was admitted May 12, 1864, with remittent fever. He had headache, weakness, pain in the back and limbs, loss of appetite and much thirst. The fever was aggravated in the morning, and did not remit until some time in the night. His tongue was yellow-coated and his skin somewhat jaundiced; his bowels were quiet. Quinine and blue pills were administered, and on the 20th the patient was improving slowly. On June 11 he was placed on light duty in the ward, and on the 18th was returned to duty.—*Act. Ass't Surg. D. C. Owens, U. S. Army, Hospital, Quincy, Ill.*

Remittent with relapse.—CASE 27.—Private Louis Eberhard, Co. E, 111th Pa. Vols.; age 47; was admitted April 27, 1865, from David's Island, New York Harbor, as a convalescent from remittent fever. He was in good general health, although somewhat debilitated. Full diet was ordered, but no medication. On May 18 he was placed on fatigue duty. On June 14 he re-entered the ward, having been sick for six days before presenting himself for treatment. His pulse was full, strong and bounding; skin hot and dry; tongue furred; breath fœtid; stools light colored; he suffered also from headache. Blue-mass was ordered on the 15th, to be followed by citrate of magnesia. Two copious stools were procured, and on the 17th he was in better condition, although the fever continued with anorexia and foul tongue. Blue pill, ipecacuanha and quinine were given in small doses every four hours, and on the 20th the patient was able to sit up. The medicine was omitted on the 21st, and on the 28th the man was well and walking about.—*Satterlee Hospital, Philadelphia, Pa.*

Remittent with hepatic complication.—CASE 28.—Private Charles Laihn, Co. E, 16th Ill. Cav.; age 42; intemperate; was admitted July 31, 1863, with remittent fever. A day or two before admission he was taken with a chill followed by the usual symptoms of common remittent fever, but accompanied with pain, tenderness, slight fulness and hardness in the region of the liver. He was treated with quinine, chalk with mercury and Dover's powder, sinapisms to the ankles and a blister to the hepatic region. The fever began to subside on August 2, but the pain and fulness in the side continued. On the 7th a half drachm of iodide of potassium with extract of hyoscianus was given after each meal instead of the quinine and mercurial, and the blister was reapplied to the side. He improved but slowly, his bowels meanwhile being very torpid and requiring the use of laxatives and enemata. The iodide was omitted on September 10, and on October 10 the patient was returned to duty.—*Act. Ass't Surg. F. K. Bailey, U. S. Army, Hospital, Quincy, Ill.*

CASE 29.—Private George Hurst, Co. D, 25th Ind. Vols., was admitted October 12, 1863, having had diarrhœa and fever for three days. He was greatly prostrated; his mind dull; countenance suffused; lips and tongue coated black; pulse 110 and quick; skin hot. Next day he was delirious. One ounce of brandy was given every hour. On the 14th the fever was found to remit in the morning, becoming increased in the afternoon. Mercury with chalk and rhubarb was given, and during the night the bowels were opened twice. Next day there was less fever; quinine was prescribed in three-grain doses three times a day. On the 16th there was less fever, but the patient vomited

frequently. Ten grains of quinine were given at once, and the mercury, chalk and rhubarb were repeated with carbonate of soda. On the following day the bowels were opened several times, and the mind became clearer. The skin and conjunctivæ became yellow-colored on the 19th, and on the 20th he had epistaxis, but was otherwise improving. He was transferred, December 31, to Adams Hospital, Memphis, and afterwards to Jefferson Barracks, St. Louis, Mo., February 22, 1864. He was ultimately returned to duty May 25.—*Union Hospital, Memphis, Tenn.*

Remittent with scurvy.—Case 30.—Private Samuel W. Flemming, Co. I, 201st Pa. Vols.; age 23; was admitted November 4, 1864, with remittent fever from which he had been suffering for some time. He was quite prostrated, being unable to speak more than a whisper; his tongue was pale, gums spongy and bowels moved with great frequency: he was anæmic and had some cough. On the 6th he was delirious; the tongue black; the teeth covered with sordes; the bowels were moved less frequently, but there was great tenderness in the right iliac region. Turpentine was prescribed. On the 10th the patient was much improved. He was returned to duty January 14, 1865.—*Hospital, Alexandria, Va.*

Remittent with dysentery aggravated.—Case 31.—Private Albert Pierce, Co. C, 24th Ind. Vols., was admitted September 22, 1863, with dysentery. [On August 8 this man had an attack of remittent fever and continued sick for three weeks, at the end of which period he was much debilitated. He was furloughed, but while bound homeward had an attack of dysentery and piles, with blood passing with the stools.] On admission he was very weak, emaciated, and had abdominal pain and tenderness, with twelve to fifteen bloody stools daily; his appetite was poor; tongue flabby coated, heavy; pulse 97 and weak; skin hot; mind dull. On the 23d pain in the umbilical region was somewhat relieved by cataplasm. The stools were frequent but not bloody on the 24th, when delirium and hydrophobia supervened. He died on the morning of the 27th, the stools becoming less frequent for some hours before death.—*Union Hospital, Memphis, Tenn.*

Remittent fever with cerebral symptoms.—Case 32.—Private Henry Taylor, Co. B, 85th Pa. Vols.; age 50; was admitted November 3, 1862, convalescing from remittent fever. As his general health and strength improved symptoms of cerebral congestion appeared. He became bright, chalk eye, with a short and full neck and turgid countenance. He was soon no less constantly attended with headache, disturbed vision and tinnitus aurium. Epistaxis, with temporary relief, was of frequent occurrence; the bowels were constipated. On the day after admission the patient was bled from the arm to the extent of fifteen ounces, with prompt and decided relief of the prominent cerebral symptoms. Low diet was enjoined, and besides the repeated use of active hydragogue cathartics the cerebral symptoms gradually yielded; but the patient continued to have at times slight returns of epistaxis, which always gave relief. His pulse becoming reduced in force and volume. He was recommended for return to his regiment February 14, and left the hospital to join it on March 4. On this case the attending physician remarks: "After the surgeon's experience of hypæmia, cachexia and adynamia, conditions so almost universally present in disease as observed at the military hospitals, and requiring as they did a supporting and tonic treatment, it was with curious interest that we recognized this exceptional case of hyperæmia demanding depletion from the general circulation, combined with low diet and active catharsis."—*Satterlee Hospital, Philadelphia, Pa.*

Case 33.—Asst. Surg. Samuel S. Partridge, 23rd Mich. Vols.; age 26; was admitted October 11, 1864. He was taken, while at Detroit on the 7th, with a severe chill which lasted an hour, and was followed by two hours of fever. On the 8th and 9th he had fever but no chills. On the morning of the 10th he took eight grains of blue pill and a Seidlitz powder, which procured an evacuation but caused much nausea and vomiting. On admission he had fever, nausea, great thirst, offensive breath, white furred tongue, constipated bowels and headache, and he had slept but little from the time of the attack: pulse 120, respiration 30. Sweet spirits of nitre and extract of ipecacuanha, lemon-water and cream of tartar were given, with a Dover's powder at bedtime; next day quinine was administered. The fever, headache and constipation continued, and on the 14th the patient was delirious during the greater part of the day. Eight grains each of calomel and rhubarb were given, followed by a saline cathartic, which caused the bowels. Next day he was conscious, his pulse regular and slow. Tea, toast, soups and panada were given. After this he improved in condition; but on the 25th he had symptoms of cerebral congestion, which were relieved by cold to the head and mustard to the feet. These attacks recurred during the early part of November, but by steadily continuing quinine and stimulants were soon caused to entirely cease. On December 26 Fowler's solution was given in fluid extract of cinchona and continued for three weeks.—*Officers' Hospital, Louisville, Ky.*

Case 34.—Private John McCammon, Co. B, 53rd Ill. Vols., was admitted August 21, 1862, with remittent fever. During the night following admission he had a fever delirium, but upon morning he was quiet. A blister was ordered, as he complained of soreness in the bowels. About 11 A. M. of this day, as he was resting quietly and engaged in conversation with a friend from camp, he suddenly sprang from his bed and jumped through the scuttle-way from the upper to the lower floor of the hospital, a distance of about thirty feet. He struck on his head and right shoulder. He was taken up unconscious and died thirty-six hours after. A clot seemed to have formed behind the right parietal as the cranial wall became considerably protruded. No post-mortem examination was made.—*Hospital, Quincy, Ill.*

Remittent with jaundice in a paroled prisoner.—Case 35.—Sergeant Samuel S. Cook, Co. B, 27th Conn. Vols.; age 18; was admitted May 17, 1862, with remittent fever and jaundice. He was taken prisoner at Fredericksburg, Va., May 3, and removed to Richmond. He had a chill two days before his capture, followed by diarrhœa and fever. On admission his tongue was furred and dry; he had headache and pain in the back; his pulse was 80 and feeble, but his general appearance was not bad: one stool was passed in the twenty-four hours. Quinine was given in five-grain doses every five hours. On the 20th he vomited bloody fluid, passing four stools on that day and on the 20th,

six or seven on the 21st and only two on the 22d. On the 23d the diarrhœa ceased and there was no fever. The patient quickly regained his strength and was returned to duty on June 13.—*Act. Ass't Surg. E. J. Radcliffe, U. S. A., Hospital, Annapolis, Md.*

Remittent with a probable typhoid element.—Case 36.—Sergeant J. N. Richardson, Co. E, 2d West Tenn. Cav.; age 22; was admitted September 24, 1863, with remittent fever. He had been a prisoner on Belle Isle since July 4, during which period he suffered from diarrhœa and chills. "This, like many other cases of fever among paroled prisoners from the South, has been very much *sui generis* and difficult to classify, having symptoms of malarial remittent and of typhoid. It has been characterized by irregular remissions, the pulse sometimes as high as 130, sometimes as low as 80, irregular diarrhœa, delirium, swellings under the chin and of the parotid and frequent micturition. He was treated with quinine, blue pill and opium, effervescing mixture, chlorate of potash and sinapisms. He began to improve in strength and flesh in November and made rapid progress to health. He was transferred to Ohio January 6, 1864."—*Act. Ass't Surg. A. Claude, U. S. A., Hospital, Annapolis, Md.*

Case 37.—Sergeant William J. Goode, Co. F, 16th Ill. Cav.; age 25; was admitted July 21, 1863, with severe fever, tongue coated, skin hot and dry, pulse frequent, bowels irritable. Quinine, Dover's powder and turpentine emulsion were prescribed. By August 2 the fever had lessened, but the bowels were more relaxed, and there was abdominal tenderness; the tongue was coated except at the tip, which was red; the stomach was irritable; the skin moist. Medicine was withheld. On the 14th the patient was improved but feeble; the bowels continued loose and the abdomen tender. Elixir of calisaya was given. The fever returned on the 19th, and recurred nightly, although the administration of quinine was resumed, until the end of the month, when profuse sweatings took place towards morning. The fever at this time was recorded as having become "somewhat typhoid." On September 3 the tongue was red at the tip but thickly coated at the base; bowels loose; pulse 60, feeble and compressible; appetite poor. Aromatic sulphuric acid was given until the 14th, when it was replaced by the elixir. The patient was pale and feeble on the 16th, but able to walk about. On the 22d there was some fever at night, and the tongue was red and coated but not dry; diarrhœa continued. On October 1 the roof of the mouth was sore and spongy. Next day a blister was applied on account of pain and soreness in the left hypochondrium. After this he improved rapidly, and deserted on the 16th.—*Hospital, Quincy, Ill.*

Recorded as typhoid but treated as remittent.—Case 38.—Private Matthew Baird, Co. C, 3d Mich. Vols.; age 23; was admitted October 19, 1861, as a case of typhoid fever. About October 5 he had been seized with pain in the head and bones, fever and chills; he had some nausea and vomiting at first, and a diarrhœa which continued for two days; the headache lasted four days; during the second week his urine had to be removed by catheter. On admission his pulse was 62 and of fair strength, skin soft and warm, tongue pale, moist and slightly coated, brownish in the center, teeth and gums clean, appetite good; he had tinnitus aurium and giddiness, but no pain, eruption nor sudamina; one thin watery stool was passed, but there was no tenderness, borborigmus nor tympanites, and the abdomen was soft; there was no cough and the urine was normal. Quinine was prescribed in full doses three times daily. Next day the face was calm and natural; the pulse 64, steady and of fair strength; the skin soft and warm; the tongue slightly pale and flabby, but moist and clean; the appetite good; one thin fœtid stool was passed. On the 22d the quinine was reduced to two grains three times daily, and during the night the patient had a chill, but next day its effects disappeared. On the 28th he rested badly and had some diarrhœa, but there was no tenderness nor tympanitis; the tongue was pale and moist and the appetite fair. The skin and conjunctivæ became jaundiced on the 31st. Small doses of calomel and opium were given. On November 4 he slept well; his mind was clear, countenance calm, bowels regular and appetite good. He was transferred to Annapolis, Md., on the 18th.—*Seminary Hospital, Georgetown, D. C.*

Remittent following typhoid.—Case 39.—Private Sidney Nafus, Co. F, 143d Pa. Vols.; age 22. [This man entered Stanton Hospital, Washington, June 15, 1863; Diagnosis—debility; and was transferred to Satterlee Hospital, Philadelphia, on the 17th; Diagnosis—chronic dysentery. He was returned to duty August 28, but contracted typhoid fever October 2, and was confined to bed for four weeks. On November 23 he was admitted to Douglas hospital, Washington, as a convalescent from typho-malarial fever, and on the 27th was transferred to Satterlee Hospital; diagnosis—intermittent fever.] On December 13 he was reported as much improved, and the quinine and carbonate of iron, which he had been taking, was omitted. On the 18th he had a paroxysm of fever, which was repeated next day; pulse 120; tongue coated and somewhat dry; skin moist; headache; tenderness in the epigastric and right hypochondriac regions. Quinine in three-grain doses was given every two hours. The fever continued, but with diminishing intensity for a week, the skin being sallow and dry, the tongue white coated, the bowels regular or constipated. The medicine was omitted on the 28th; but on January 1, 1864, the heart's action became much increased, pulse 138 and skin hot and dry. Digitalis was given and a blister applied to the chest. Next day the skin was cool and the pulse reduced to 96. After this he was treated occasionally with digitalis, but he remained weak for a long time. He was put on guard duty April 25.—*Satterlee Hospital, Philadelphia, Pa.*

Continued fever quickly changing to remittent and intermittent.—Case 40.—Private George H. Gardner, Co. G, 19th Me. Vols.; age 19; was admitted December 16, 1862, with varicocele. After some time he became affected with sore throat and pain in the ears, and presented symptoms which the attending physician was inclined to attribute to the presence of the typhoid fever poison. On January 5, 1863, the first day on which these were noticed, the skin was hot, face flushed, tongue furred, pulse tense and rapid and there was considerable gastric disturbance. On the 6th these symptoms were much increased. On the 7th the fever was accompanied by diarrhœa with tenderness in the abdomen, pulse about 95, tongue coated but moist, red on the edges. Neutral mixture and sweet spirits of nitre were given. Next day there were two rose spots; the abdominal tenderness was increased; the mouth not so moist,

but not dry: both ears were discharging freely, and there was great drowsiness. On the 9th there was profuse sweating, but the abdomen continued painful, especially on pressure: the fever was much increased, the pulse having risen to 120: but towards noon there was a decided remission, lasting about three hours, during which the skin was cooler and the patient in a pleasant sleep. At noon on the 10th a distinct chill was followed by a fever of about three or four hours duration. Quinine in three-grain doses was given every three hours. Tenderness and pain in the abdomen continued. The chill recurred at noon of the 11th, but was not so violent as on the previous day: the patient complained of great pain in the right shoulder, and was unable to move the arm, which was very sensitive to pressure, but without redness or swelling: he also complained of pain in connection with the liver; the eyes were not at all yellow but natural, and there was diarrhœa. The quinine was continued. No chills nor fever occurred on the 12th: the pain in the shoulder continued, but there was no more pain over the liver than over any other part of the abdomen, in which there were acute flying pains seemingly neuralgic in character. Next day the patient was much better: tongue cleaner, appetite returning, shoulder less painful and fever absent. Quinine was continued in two-grain doses every four hours. On the 15th he sat up for a short time, but the pain in the shoulder was troublesome and was felt even as late as the 30th. "The above case is presented as a curious instance of what was apparently typhoid fever in its commencement, changing to remittent and then to intermittent fever in the short space of a week."*—*Satterlee Hospital, Philadelphia, Pa.*

Remittent followed by intermittent.—Case 41.—Private Thomas Gaitly, Co. E, 19th Mass. Vols., had a paroxysm of intermittent fever on November 9, 1861. He had been recently discharged from hospital on recovery from remittent fever. He was readmitted on the 10th and had a marked paroxysm on admission. Fifteen grains of quinine were given at a dose, with five grains in a half ounce of whiskey to be taken thereafter three times daily. On November 12 there was no return of the chill; the patient's appetite was good and he felt well but weak. He was returned to quarters.—*Regimental Hospital 19th Mass. Vols.*

Remittent ending fatally.—Case 42.—Private Christopher Commars, 69th Co. 1st Batt. V. R. C.: age 22: was admitted November 11, 1863, with remittent fever. He said he had been sick for six days, but had continued on duty although he suffered from a chill on the 10th. On the 11th he had a severe chill and was sent by the medical officer of the day, who ordered him into the ward. Two grains of quinine were given three times a day. On the 12th he had vomiting, and pain and tenderness in the left side of the chest. The quinine was omitted and three grains of calomel ordered every four hours until four powders had been taken, with a Seidlitz powder after the last dose. The bowels were moved on the 13th, but the vomiting continued until death on the 16th. During his sickness the patient expressed no anxiety as to its result: he was confident that he would be able to return to duty in a few days.—*Act. Ass't Surg. Henry M. Dean, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 43.—Private David Kensinger, Co. I, 8th Penn. Vols.: age 19: was admitted May 5, 1864, suffering from remittent fever and debility. Quinine in five-grain doses three times a day was prescribed and an ounce of castor oil administered. On the 13th the patient had a hot skin and frequent pulse, with much prostration, wakefulness, restlessness, loathing of food, nausea and vomiting, but no pain. Carbonate of ammonia and brandy were prescribed. On the 14th there was a slight abatement of the fever in the morning and an exacerbation in the evening, which became more marked on the evening of the 15th. On the 19th there was much nervous disturbance, restlessness and jactitation. On the 21st the stools became frequent and the tongue dryer and darker. On the morning of the 22d the tongue was not so dry as during the preceding paroxysm, but in the evening the patient became delirious. After this each successive exacerbation was more severe and protracted, and each remission less decided until death took place on the 28th. Clammy sweats, collapsed features, involuntary passages and imperceptible pulse preceded death for several hours.—*Act. Ass't Surg. J. H. Coover, U. S. A., Hospital, Annapolis, Md.*

Malarial congestions.—Case 44.—Private H. Straight, Co. C, 154th N. Y. Vols.: age 25: was admitted December 12, 1862, with jaundice, chronic nephritis, enlargement of the spleen and dulness on percussion over the summit of the left lung, with some rude respiration and a dry hacking cough. His sickness began during the Peninsular campaign with a severe attack of remittent fever. He was much emaciated and had anorexia, lassitude and mental dulness: his stools were deficient in bile: his urine was albuminous: the pulse about 90: rigors and exacerbations occurred every evening. Iodide of potassium and bicarbonate of potash were prescribed, each in five-grain doses three times daily, with fluid extract of taraxacum in teaspoonful doses and the application of tincture of iodine over the enlarged spleen. By December 20 the jaundice was somewhat lessened and the stools tinged with bile, but the cough was aggravated, the sputa nummular and blood-stained, and the patient complained of flying pains through the body and of constant nausea. On examination it was found that his lungs had both of tuberculosis. An anodyne expectorant mixture was prescribed. Ten days later, while the jaundice was disappearing the nephritic symptoms became prominent. Tincture of iron with quinine in two-grain doses three times a day was added to the previous treatment. By January 8 the nausea had ceased and the appetite was better: the dulness in the urine was decreasing in quantity although the patient complained of great pain over the region of the kidneys and along the ureters. The iodine mixture was omitted and the following substituted: Ten grains of bicarbonate of potash, three drops of liquor potassæ, five drops of tincture of cantharis vesica and one fraction of extract of pareira in in-

* It is possible that an explanation of the anomalous course of the constitutional disturbance in this instance might have been discovered by a close examination and report of the progress of the aural inflammation. Diffuse inflammation of the ear is often accompanied with much febrile action, headache and sensation of dulness, which is in reality a disinclination to be disturbed by enquiries. The fever subsides on the establishment of a discharge from the ear, and slight exposures not unfrequently cause a sudden suppression of the discharge with a recurrence of the febrile condition often-times preceded by rigors and gastric disturbance. The local inflammation with its symptomatic fever superimposed on a case of specific fever of so mild a character as to be scarcely noticed, except as regards diarrhœa, some abdominal tenderness and two rose-spots, might be regarded as accounting for the changes which constitute the anomaly of the case.

taken in a tablespoonful of mint-water three times a day. On January 14, 1863, the splenic enlargement and lung symptoms continued unchanged, but otherwise the patient's condition was much improved. By January 25 the albuminuria had ceased and the patient had gained flesh but was still very weak. Cod-liver oil was substituted for the potash mixture; the quinine and iron were continued and iodine was applied over the spleen. On February 8 the pulmonary symptoms had almost disappeared and the patient's strength was returning. He was sent to his regiment for duty on the 14th.—*Satterlee Hospital, Philadelphia, Pa.*

Case 45.—Private Robert Wilson, Co. D, 1st Ky. Vols.; age 24; was admitted May 27, 1861. He had been sick for two weeks with inflammatory rheumatism, for which he had taken colchicum, quinine and opiates. On admission he had fever and delirium, pain in the chest, with roughened respiratory murmur, vomiting and relaxation of the bowels; his tongue was large, moist and white; skin moist, extremities cool; pulse 128 and feeble. One grain of quinine with three of Dover's powder was given every three hours. He was very restless and did not sleep during the following night; his bowels were moved frequently and sometimes involuntarily, the stools being dark green and watery, and there was much gurgling on pressure in the right iliac region. At midnight a pint and a half of dark-colored urine was drawn off by catheter; sudamina appeared on the abdomen and lower part of the chest. Next morning the pupils were dilated, the right to a greater extent than the left, and there was dulness of hearing. A pint of urine was withdrawn. There was a good deal of pain in the chest, but the bowels were quiet until 2 P. M., after which the stools were frequent, dark and watery; the delirium increased and the tongue became so swollen as to cause much suffering. He died at 7 P. M. No autopsy. [After death a medical officer stated that this man had been seized two weeks before with a paroxysm resembling a congestive chill; that he had been bled from the arm, and that reaction had been established with much difficulty.]—*Marine Hospital, Cincinnati, Ohio.*

Remittent followed by congestive fever.—Case 46.—Private James S. West, Co. D, 16th Ill. Vols., had a very severe attack of remittent fever from which he recovered and was detailed on hospital duty. On July 3, 1862, while thus employed, he was taken with a congestive form of intermittent fever. Mercurial cathartics and enemata were given, with quinine, iron and pepsin, without avail, for the congestive paroxysm returned daily, and finally the patient sank into a completely typhoid state and died August 1st.—*Hospital, Quincy, Ill.*

Congestive fever.—Case 47.—Private John Boman, Co. B, 5th Ill. Cav., was admitted September 1, 1863, having had diarrhœa for three days. Early on the following morning he was found unconscious, with sluggish respiration, quick feeble pulse and clammy yellow skin. He had vomited viscid dark-green matters and passed involuntary stools which were offensive and bloody. A tablespoonful was given every hour of a mixture containing thirty grains of quinine in two ounces of cinnamon-water acidulated with aromatic sulphuric acid. At 4 P. M. the pulse was better. Fifteen grains of chlorate of potash were ordered to be taken every four hours with stimulants and beef-tea. He rallied much during the night, but in the morning relapsed into his previous condition. The administration of quinine was resumed, but death occurred at 5 P. M.—*Union Hospital, Memphis, Tenn.*

Case 48.—Private Edwin Graves, Co. D, 86th N. Y. Vols.; age 26; was admitted March 17, 1862; diagnosis—typhoid fever. He was taken sick about March 12 with pain in the chest, headache, nausea, feeling of general swelling and much debility, succeeded by a chill, fever and profuse perspiration, which symptoms recurred daily about 11 A. M.; he had also much annoyance from a numb feeling in his fingers. On admission the pulse was rapid and quick; the skin hot and moist; the tongue moist, red and slightly coated; the patient's appetite was poor and he had some diarrhœa and pyrosis. He stated that the chill and fever occurred at the same time in rapid alternations in different parts of the body, the paroxysm lasting two or three hours. Twenty-four grains of quinine were directed to be taken during the day. He was delirious during the 18th; his pulse rapid and weak; skin natural; tongue moist and coated white. Punch and beef-essence were given every two hours. He died delirious on the morning of the 19th.—*Seminary Hospital, Georgetown, D. C.*

Malarial rheumatism.—Case 49.—Sergeant Michael Leffey, Co. F, 119th Pa. Vols.; age 24; was admitted March 20, 1863, having been affected with intermittent fever since early in January. On admission he had pain in the back and left side and tenderness over the lumbar vertebræ; he had tremors, and was unable to stand erect. He was treated with quinine, powdered iron, morphine and camphor, with tincture of aconite as a local application. He was transferred to Christian street hospital April 21 [where his case was diagnosed chronic rheumatism, and whence he was discharged June 2, because of general debility].—*Satterlee Hospital, Philadelphia, Pa.*

Malarial neuralgia, debility and œdema.—Case 50.—Private Martin L. Robertson, Co. K, 4th Me. Vols.; age 23; was admitted December 12, 1862, for torpidity of the liver, which was treated with mercurials and salines. During his convalescence he had a severe attack of tonsillitis ending in suppuration of both glands. Soon after this he was seized with violent pains in the head and face, assuming the forms of supra- and infra-orbital neuralgia, the paroxysms of which were distinctly periodic, sometimes quotidian and again on alternate days. During the exacerbations he complained of numbness on the right side, with prickling of the skin of the face and a sense of fulness in the head. Cups on the back of the neck and purgatives gave some relief to the symptoms, but dimness of vision followed, with unpleasant illusions. Extract of belladonna applied around the eyes relieved the pain slightly; but it was soon thought advisable to have recourse to cinchona, the disease being conceived to be dependent upon the action of malarial or miasmatic poisoning contracted on the Rappahannock, but remaining until now latent in the patient's system. Quinine was perseveringly tried for some time, but it failed to arrest the paroxysms (as had been previously observed in some analogous cases in the hospital). Fowler's solution in five-drop doses was substituted, and after a few days the neuralgic symptoms began to yield sensibly to its influence (as had also happened in similar cases where the cinchona had failed). After exhibiting the medicine for a week, slight sickness of the stomach seemed to suggest its discontinuance, and it was accordingly laid aside for a short time, when it was again resumed

with benefit at intervals. The original hepatic disorder reappeared, requiring a repetition of the mercurials. The strength of the patient had failed considerably, but his nutrition was pretty well maintained. On March 28 he had a severe bilious attack, requiring mercurials and laxatives, to which it soon yielded, but he was left with some wandering neuralgic pains in the head, arms and other parts of the body. The nervous system was impaired in power, and it seemed impossible to rally his strength and spirits. Tincture of iron was given after the suspension of the Fowler's solution. On April 2 the neuralgic pains were very nearly gone, but his system remained enfeebled and his spirits despondent. At this time he was transferred by order to a hospital in Maine.—*Satterlee Hospital, Phila., Pa.*

Case 51.—Private Jno. V. Martin, Co. G, 13th Wis. Vols., was admitted December 8, 1864, as a marked case of anæmia following intermittent fever. He had occasional attacks of neuralgic supraorbital pain severe in character, with serous effusion around the eyes, sometimes almost filling the orbit; the sclerotic was very white and the eyes watery. He was improving rapidly and promising a speedy return to health, when a recurrence of the intermittent fever was followed by a return of the supraorbital pain and the anæmic condition. After rallying from this another recurrence was productive of similar results. He was treated with quinine, iron and wine. A prescription which appeared of value in this case consisted of forty grains of chlorate of potash, twelve of citrate of quinine and iron and two of powdered capsicum, taken in four doses during the day.—*Hospital, Quincy, Ill.*

Case 52.—Private Daniel W. Huff, Co. H, 104th Pa. Vols.; age 29; was admitted September 1, 1864, suffering from enlarged spleen and general debility induced by malarial disease. He had severe neuralgic pain in the back and limbs; his feet and legs frequently became very much swollen, which condition, as it could be traced to no marked lesion of the viscera, was referred to weakness of the circulation and anæmia. The treatment consisted of a general alterative and supporting course. Iodide of potassium, iron in various forms, vegetable bitters, mineral acids, stimulants, counter-irritation and anodynes were employed in accordance with the indications. No improvement, however, was apparent; in fact he seemed to decline. After remaining in hospital three and a half months he was discharged from the service December 16, 1864.—*Hospital, Alexandria Va.*

III.—SYMPTOMATOLOGY OF MALARIAL DISEASE.

I.—Intermittents and Remittents.—The cases submitted above illustrate the recurrence of the intermittent paroxysm daily, every second day, or every third day, with the frequent relapses which occurred in the progress of the disease and the congestions of the abdominal organs as manifested by enlarged spleen, diarrhœa, dysentery and jaundice. The debility and anæmia consequent on the prolonged action of the morbific cause are incidentally mentioned, and as a result of the altered condition of the blood, boils and ulcers are noted among the sequelæ of the disease. Consumption appears to have found favorable conditions for its development in systems broken down by the continued influence of the ague-poison. The identity of the cause of the intermittent and remittent fevers is indicated by the interchangeable character of these fevers, tertians developing into quotidians, and these into remittents and congestive fevers, and the remittents becoming intermittent in their favorable progress. The remittents also appear to have assumed a typhoid character; but whether this was due to the presence of a specific poison or to some depressing agencies developed in the system by the malarial influence is not manifest from these records. On the other hand remittent is seen to have followed typhoid fever; and here also it is not evident that there was any connection in this other than the accidental sequence of the disease causes.* The relapses that occurred in remittent cases are illustrated as well as the frequent association of diarrhœa, dysentery and hepatic congestion with the febrile phenomena. The concurrence of scurvy is also observed. The tendency to an adynamic condition is noticeable in so many that a hyperæmic case in which bloodletting was used in the treatment on account of acute cerebral congestion was considered worthy of special comment by the reporter. More or

* S. K. Towle, Surgeon 30th Mass. Vols., in "Notes of Practice in the U. S. Army general Hospital at Fortress Monroe, Va., during the year 1862," published in the *Boston Medical and Surgical Journal*, Vol. LXX (1864), pp. 49-50, and in the compiled statistical report of diseases observed in the hospital says: "Indeed the symptoms of many of the cases would indicate rather a combination of diseases than any one disease—fevers being frequently complicated with diarrhœa or dysentery, and vice versâ, so that one would hardly know under which class to make the record. And again, with the different variety of fevers, the record will often depend upon the period of observation; an intermittent, with well-marked stages, will, if neglected often in a few days become an equally well-marked remittent, or typho-malarial, or a little further on will prominently exhibit advanced typhoid symptoms; or perhaps a few weeks or months later die from chronic diarrhœa or dysentery."

loss of congestion of the brain, lungs, liver, spleen and kidneys was occasionally recognized, and in some of these cases the internal congestion was so sudden and violent as to cause speedy death. Rheumatism and neuralgia are also suggested as consequent upon the malarial influence.*

But nothing is said of the aggregation of symptoms which led to the diagnosis of intermittent or remittent, as the case might be. The presumption is that in general there occurred no special alteration from well recognized characteristics. In fact in some of the sanitary reports it is definitely stated that nothing unusual was presented by the malarial diseases under observation. In the intermittents the onset of the disease may be assumed with or without preliminary feelings of languor, weariness, indisposition for physical exercise or mental work, depression of spirits, yawning, aching in the bones and soreness in the muscles, with creeping or chilly sensations along the spine, loss of appetite and perhaps nausea, which had been noted as having recurred for days prior to the advent of the regular paroxysm. We may assume the cold stage as having presented its chills, developing perhaps into rigors, and accompanied with goose-skin, shrunken features and lividity of the lips and nails, and with internal congestions manifested by nausea and irritability of stomach, epigastric pain, splenic or hepatic uneasiness, hurried respiration, rapid, irregular or slow pulse, irritability of temper, headache, confusion of mind, drowsiness or even stupor and coma; the gradual accession of reaction, the alternations of flushings and chills until in the full development of the hot stage the cheeks became flushed, the skin hot, the mouth dry, the tongued furred, the respiration accelerated and the pulse full and strong, or frequent and feeble, if the patient was reduced by previous attacks of this or other enervating disease; and lastly, concurrent with the outbreak of free perspiration, the gradual subsidence of these symptoms and the re-establishment of a comparatively normal condition until the commencement of a succeeding paroxysm. We may assume also the various irregularities frequently presented, especially by the cold stage, it having been sometimes almost absent or indicated only by depression of spirits, yawning or some other comparatively trifling symptoms quickly followed by fever.

In the remittents we may assume a preliminary stage of such malaise as seemed due to hepatic disorder, followed by a chill and the development of a febrile condition, with anorexia, thirst, nausea and bilious vomiting, epigastric or hepatic tenderness, pains in the back and limbs, hot, dry and perhaps jaundiced skin, hurried breathing and frequent pulse with throbbing headache, tinnitus aurium and occasional delirium. We may infer also constipation, a foetid or bilious diarrhœa or, even, dysenteric symptoms, as presented by the bowels and a large, coated and furred tongue, cleaning as a favorable issue was promised, or becoming dark colored as hiccough, low delirium, involuntary stools, clammy perspirations, collapse, stupor and coma indicated impending death; while the exacerbations and remissions are implied in the name.

On examining the cases that have been presented enough may be found to warrant the acceptance of the above remarks.

The skin was sallow or pallid in the protracted cases; and in the paroxysmal recurrences when its condition is mentioned, it was hot and dry or moist, according as the notes were taken during the exacerbations or remissions: occasionally it is said to have been jaundiced. The pulse is represented as rapid in the majority of the cases, and

* Although neuralgia was frequently regarded as a clinical associate of malarial fevers, or indeed as the legitimate offspring of the malarial poison, the cases reported on the monthly reports had no autumnal tides of prevalence to indicate their connection with or dependence upon the cause of the paroxysmal fevers. (See diagram facing page 874 of this volume.) To account for this we must assume that all neuralgic cases in any way connected with malaria must have been reported under the heading of *miasmatic diseases*, or which seems more probable, that neuralgia was less frequent in its association with malarial disease than was currently supposed.

when its volume, impulse and resistance are not specifically stated, feebleness may be inferred as its characteristic, for emaciation, debility, prostration or anæmia is noted in twenty-three of the cases. The pulse is reported in case 40 as tense; but in this the malarial character of the attack is not satisfactorily established. It is stated to have been full and strong in three cases, one of which, 3, was a case of tertian ague, the second, 27, a relapse in a remittent case, and the third, 32, a remittent reported as being of an unusually sthenic type.

The tongue in twenty-five cases in which its appearance is recorded was clean in one; white or furred in fourteen; pale in one; large and white in one; soft, pale, moist and coated in one; brownish in the centre and afterwards becoming pale and flabby in one; dark-brown or black in three; red at the tip in two, and at the edges in one. The clean tongue was recorded in a chronic case, 7, during the absence of paroxysmal manifestations; the pale tongue in the scorbutic case, 30, in which it afterwards became black and was accompanied with delirium. The brown or black tongue appeared also in three cases, 29, 31 and 43, in which there was likewise delirium with much prostration, and in the last two instances a fatal issue. The tongue was red at the edges in the anomalous case 40, and at the tip in two cases, in one of which, 20, there was nothing to suggest that it was other than a remittent attack, while in the other, 23, the specific poison of typhoid fever was considered to be present.

The condition of the tongue in malarial fevers is usually stated by medical writers as white or yellow-coated, becoming dry and of a brown or black color when the case assumes a serious aspect; as for instance Horton, Martin, Aitken, Copland, Watson, Bartlett and others,* many of whom speak of the edges and tip as being of a brighter red than natural. The descriptive clause, *red at the tip and edges*, is suggestive of the condition of the tongue in typhoid fever, and, indeed, in Horton's statement of the pathological changes in his febrile cases the patches of Peyer were sometimes found inflamed and ulcerated. There is a probability, therefore, that specific typhoid may have been present in many of the tedious and low forms of fever that occurred in the practice of our medical men before the war; and that the condition of the tongue in such cases may have been embraced in the account of the symptoms of remittent as given by Jones, Doniphan, Boling and others.†

But in Sir J. R. Martin's description the red edges and tip are distinguished from a similarly stated condition in enteric fever by the words *loaded*, *clammy* and *moist*, as applied to the tongue generally. His account of the disease corresponds with that given of the Rio Grande remittents by Dr. Peck in the report presented below,‡ in which the red tip and edges of the tongue are specially mentioned. In the Bengal fever, as in that of the river bottoms of New Mexico, there is seldom evidence of a co-existing enteric lesion. Hence a tongue with red edges and tip may be considered present in fevers of a purely malarial origin, although during our war this condition was seldom noticed. The tongue was generally soft and flabby, somewhat enlarged, broadened, thickened and indented at the margins, of a pale, livid or bluish tint, and more or less coated or furred white, yellow or brownish, according to the severity of the pyrexial attack.

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* J. A. B. HORTON, M. D., in his treatise on *Diseases of Tropical Climates*, London, 1879, p. 66, says of the tongue as it appears in the marsh remittent fevers, that "it is more or less furred, redder than natural at the tip and edges." And again, on p. 68: "The tongue at the commencement of the disease is generally covered with a thick whitish or yellowish-white fur, thicker towards the centre, having a feeling of being large and flabby, and marked on its periphery by impressions of the teeth; the edges are usually red, but in a more advanced stage the coating assumes a darkish brown appearance. Sometimes the tongue is dry, presenting several furrows, accompanied with severe thirst." Sir JAMES RANALD MARTIN, in his *Influence of Tropical Climates*, London, 1861, p. 314, speaking of the remittent fevers of Bengal, states that "The tongue is red at the tip and edges, loaded, clammy and moist, sometimes with a bitter or bad taste, the organs but little changed from the healthy appearance." AITKEN, in his *Science and Practice of Medicine*, describes as follows: "The tongue, in the mild form of the disease (fever and ague), is clean in the cold stage, white in the hot stage, and again cleans after the sweat has flowed. In severe cases the tongue is white during all the stages, and also during the apyrexia, while in the worst cases it is brown in all the stages."—American edition, 1866, Vol. I, page 483. COPLAND'S *Dictionary of Practical Medicine*, London, 1858, Vol. I, p. 345, says that the tongue in remittent fever is "commonly moist or flabby and coated, and afterwards dry, rough or brown" and on page 335, that the tongue in intermittent fever "is white and loaded." CONDIE, in the American edition of WATSON'S *Practice*, Philadelphia, 1858, p. 502, in his article on Remittent Fever, says: "The tongue is usually moist, red at the sides and edges, and coated on its upper surface with a whitish, light brown or yellowish fur, which, in grave cases, becomes considerably thick." BARTLETT, in his *Fevers of the United States*, 3d edition, Philadelphia, Pa., 1858, p. 36, says: "The tongue is generally more or less thickly covered with a yellowish or dirty white fur—the color being probably occasioned in many cases by the fluids ejected from the stomach. The edges of the tongue are often somewhat redder than natural. During the early periods of the disease the tongue usually retains its moisture; but in grave cases, especially, and after the third or fourth paroxysm, it frequently becomes parched and dry, dark brown or nearly black on the dorsum, more intensely red on its edges, and sharpened at its point." GEORGE B. WOOD thus gives the appearance of the tongue in a fully-formed case of remittent fever: "The tongue is now thickly and uniformly covered with a white or yellowish-white coating, which, as the disease advances, often becomes brown or blackish, especially in the centre. In moderate cases the tongue is usually rather moist throughout the disease; but, in those of a higher grade, it not unfrequently becomes dry or dryish, and sometimes chapped or fissured upon the surface. It is occasionally disposed to be dry in the paroxysm, and to become moist in the remission. At the sides, when not covered with fur, it is usually red, and not unfrequently indented by the teeth, in consequence of being somewhat swollen."—See *Practice of Medicine*, Philadelphia, Pa., 1847, Vol. I, p. 258.

† [illegible] *Pathological Phenomena of Malarial Fever*, Philadelphia, 1850, says: "The tongue was generally large and of a bright red color. In the mildest cases the tongue was only slightly coated with white and light yellow fur, and the tip and edges were redder than normal. In the severest cases the tip and edges of the tongue assumed a bright red color, and the tongue was much drier than in the milder cases." * * "The fur on the tongue in many cases was thick, and of a yellowish-brown color." And further: "In the active stages of remittent fever the tongue, in many cases, especially if it be the first attack of fever, presents upon those portions which are clean a brilliant scarlet color, and dry, glazed surface; the papillæ are enlarged; the fur which frequently coats the tongue is of a yellowish or brownish-yellow, and sometimes black color, and almost always dry; the tongue, in many cases, feels, when the finger is passed over it, as dry and harsh as the surface of a rough board." D. A. DONIPHAN, M. D., in *Remarks on the Bilious Remittent Fever of certain portions of Louisiana*, describes the tongue in the early stages as red on the tip and edges, covered on the dorsum with a white or pale yellow coat, stating that in the advanced stage it "changes to a brown or dark brown dorsum, while the tip and edges are red, and present a glazed appearance."—See *West-[illegible] Lancet*, Cincinnati, Oh., Xy., 1846, Vol. IV, p. 212. WM. M. BOLING, M. D., of Montgomery, Alabama, in *Observations on Remittent Fever as it occurs [illegible] Alabama*, says: "The tongue in the first exacerbation may remain moist, sometimes almost natural; but in most cases the edges will become red in a perfect health, and the dorsum covered with a thin yellowish or dirty white fur." * * "In the third or fourth exacerbation it is not unfrequently dry at least on the dorsum, though the edges remain moist, and still later it becomes parched, rough and cracked."—*Am. Jour. of Med. Sci.*, Philadelphia, N. S., Vol. XI, 1846, p. 297.

‡ Page 124.

Thus, Surgeon S. K. Towle, 30th Mass. Vols.,* referring to the diagnosis of fever cases, says: "The white, thick, pulpy, rounded tongue will dumbly speak of malaria." Surgeon E. C. Bidwell, 31st Mass. Vols.,† had already made note of the thickening and rounding of the sides of the tongue, and considered this condition an unmistakable evidence of the presence of the malarial poison in the system.

Dr. T. C. Osborn of Alabama,‡ has described and figured a condition of the tongue which he claims to be a pathognomonic symptom of malarial disease existing in all cases, both acute and chronic. Its essential feature is that the tongue presents a more or less wide, smooth margin, with slightly flattened and crumpled sides and edges. The color amounts ordinarily to a very faint bluish tinge, which is often lost or merged in the various tints or furs produced by other diseases. According to Osborn the crenated or crumpled condition of the edges is not due to the impression of the teeth, for the transverse lines are closer together than would happen if this was their cause, and they are observed in infancy and old age, when no teeth are present.

The appetite in the cases which have been presented is said to have been good in two instances, 7 and 11, but in both the reports were made during the progress of recovery. Ordinarily, in acute attacks of malarial disease, there was anorexia or impaired appetite with nausea and perhaps vomiting, these symptoms being noted in fifteen of the cases. Thirst appears less frequently, having been recorded only in two cases. Disordered digestion was manifested in two cases, 27 and 33, by fœtor of the breath. Constipation is mentioned in seven and diarrhœa or dysentery in twenty-two of the cases in which the condition of the bowels is recorded.

Abdominal pain or tenderness is usually reported as having been in the epigastric, hypochondriac or umbilical regions. In one instance, 30, the scorbutic case, the right iliac region is stated to have been tender. The abdomen was tympanitic in one case, 23, in which typhoid fever was considered to have been present.

Headache is reported in nine cases, in two of which delirium also is said to have existed; but as there are six cases in which delirium occurred, although headache, if present, was not reported, the frequent presence of cerebral symptoms in these malarial fevers must be accepted. Epistaxis in one of the cases, 32, in which the delirium was accompanied with tinnitus aurium and disturbed vision, gave temporary relief to these special symptoms; but in case 29 the spontaneous bleeding from the nose did not take place until after the delirium had begun to subside. Ringing in the ears was present also in cases 38 and 40; in the former a diagnosis of typhoid fever was entered, but the patient was treated successfully by quinine; in the latter an aural inflammation gave a sufficient explanation of the tinnitus.

The delirium in a few of the cases, as in 32 and 33, appeared due to cerebral hyperæmia, but in the larger number it was manifestly of an asthenic character, and the concurrent symptoms were in some instances such as to suggest the use of the word typhoid for their expression. In 29 the patient was greatly prostrated and his lips and tongue coated black; in 30 he was unable to speak, his tongue was black, his teeth covered with sordes, and there was tenderness in the right iliac region; in 36 there were "symptoms of typhoid" and swelling of the salivary glands; in 43, clammy sweats, involuntary passages, collapsed features and imperceptible pulse; and in 45, involuntary passages, gurgling on pressure on the right iliac fossa, dilated pupils and dulness of hearing. Whether these symptoms were manifestations of the malarial agency or indicative of the typhoid fever-poison cannot be decided by the records, although it seems likely that an adynamic condition may have existed independent of the specific poison of enteric fever, for in 29 and 43 there appears nothing to warrant the supposition of a specific typhoid element.

The characteristics of the intermittents consisted of the persisting tendency to recurrence induced by continued exposure to the influences determining the primary attacks, the liability to a fatal issue by a change to the remittent type or by the sudden onset of a pernicious attack, and the gradual production of that depraved condition of the system known as chronic malarial poisoning.

The remittents were characterized chiefly by the accompanying asthenia, and as this was present in cases free from diarrhœal, pneumonic or marked cerebral symptoms, as well as in those in which one or more of these symptoms gave increased gravity to the attack, it must be referred to a deterioration in the constitution of the subjects caused by the malarial or some antecedent influence. The frequency of diarrhœa as a concomitant must

* In his paper cited *supra*, p. 119.

† This officer, in an article entitled *Diagnosis of the Malarial Diathesis: New Test Symptom*," says: "It is a very peculiar and abnormal appearance of the tongue, in which its under surface appears to have trespassed upon the upper, the papillæ of the latter being supplanted by the transverse *rugæ* of the former. The sides are thickened and rounded, the normal well-defined edge being obliterated, and the line of demarcation moved nearer to the mesial line. This appearance of the sides may be associated with any and every possible appearance of the remaining papillary surface, clean or coated, thick or thin, light or dark, just as the malarious disease may be attended by any and every variety of morbid condition of the system. Through all this variety it is perfectly distinct, and, when once learned by actual inspection, is unmistakable."—*Boston Med. and Surg. Jour.*, Vol. LXVIII, 1863, p. 36.

‡ T. C. OSBORN—*Remarks on a peculiar appearance of the tongue in malarial disease.*—The *Western Jour. of Med. and Surg.*, Vol. VIII, 1851, p. 109—also by the same, *A peculiar appearance of the tongue in Malarious disease.—Trans. of the Amer. Med. Assoc.*, Vol. XX, 1869, p. 175 [with colored plate]—and *A new variety of Malarial Fever.—New Orleans Jour. of Med.*, Vol. XXI, p. 664. The reference to a trespass of the under on the upper surface in Dr. BIDWELL'S article is a singular coincidence, if he was unaware of Dr. OSBORN'S paper published in 1851, in which occurs the following: "The most fixed condition of this symptom is an appearance of *indentation* or *crimpling*, transversely, which is apparently confined to the subjacent tissue, while the superficial tegument is moist, smooth, and transparent. In a word, it seems to be a continuation or encroachment of the inferior surface upon the superior and lateral borders of the tongue, greater as we approach the root of the organ."

be attributed to the simultaneous action of the vapors of the above fumes and the malarial poison. Where so many men were affected with diarrhœa a certain percentage of diarrhœal complications was to have been expected among the remittents, irrespective of the action of the malarial poison on the integrity of the alimentary mucous membrane. But as it is certain that the coincidence of diarrhœa and pernicious fever was greater than could be accounted for by these considerations, we are at liberty to consider it either as due directly to the malarial agency or as a further illustration of the proposition that the malarial influence, other conditions being equal, is more readily manifested in the debilitated than in the strong and healthy. The diseased action as it affected the lungs, excluding from consideration the supervention of pernicious chills was not manifested by any urgent or prominent symptoms; it appeared rather to progress insidiously as in the course of typhoid fever. If cases occurred such as were described by Maisin in 1857 under the name of malarial pneumonia and by Gaines of Mobile in 1860,* who proposed for them the title of remittent pneumonia, forms they were not recorded by our writers as manifestations of malarial disease. The incidence of the disease-poison on the liver was very generally manifested by bilious vomiting and not unfrequently by jaundice, in some instances this latter symptom was so strongly marked as to suggest the idea of yellow fever.† The kidneys did not come into prominence in the symptomatology. The urine was affected during the febrile condition and in the jaundiced cases it participated in the general coloration, but it is not often mentioned as having been albuminous or sanguinolent.

The following extracts from special reports refer to the symptoms of the intermittents and remittents:

Surgeon M. R. Gage, *25th Wis. Vols.; Columbus, Ky., March* 31, 1863: Bilious fever, as we have seen it in our present location, presents the following symptoms: For many days before the patient gives up he complains of languor, bitter taste in the mouth, slight feelings of nausea, disinclination for food, sometimes constipation, and very generally a considerable degree of heavy, dull pain over the eyes. A chill, more or less severe, generally precedes the attack, followed by increased heat of the entire surface, and slight to severe pain in the lumbar region, the skin becomes hot and dry, the countenance flushed, the eyes red and watery, the pulse quick and breathing hurried; extreme irritability of the stomach is a frequent and distressing symptom, and for many days sometimes, a persistent vomiting, nearly everything in the form of ingesta being rejected. There is commonly considerable thirst, a marked increase in the urinary secretion, which is highly colored and has a strong odor, and after the disease has continued for a time the skin shows a yellow tint, which may also extend to the eyes. An exacerbation and remission of the fever takes place during the twenty-four hours, each succeeding exacerbation, perhaps, acquiring greater severity. The symptoms above described, greatly intensified, with a more rapid pulse, suppression of urine, and the rarely marked remission, constitute the severer form of the disease. To allay the pain in the head and back, which is often distressing, mustard applied to the nape of the neck and the small of the back, together with cold applied to the head, often affords prompt relief. If the suffering is intense and the case more urgent, cupping the temples and back of the neck is of the first importance, and should by no means be neglected: so also the cups may be applied to the epigastrium, if, as is sometimes the case, a feeling of death-like oppression is a constant and serious symptom. Cathartics are at once resorted to, the prescription generally used being as follows: Four grains of podophyllin, ten grains of bicarbonate of soda and ten grains of calomel, divided into six powders, one of which is taken once in two hours. This combination ordinarily produces very free catharsis, and, together with the means already brought into use, often affords prompt and permanent relief, and paves the way for a condition necessary through the course of the disease hereafter, if the latter is not abnormally mild or short. During the period confined to water to which a little soda has been added, and of such a temperature as to feel [illegible] to the patient during the exacerbation, it is a matter

* Reports to Prof. Simmons on Malarial Pneumonia.—See [illegible] Medical Times and Gazette, Vol. I, 1857–8, p. [illegible]. Remittent pneumonia. At Emily and Grace [illegible] Marine Medical Society, Vol. I. See [illegible] p. 15.—The Boston Med. and Surg. Journ. Vol. XI, p. [illegible]. Maisin describes two [illegible] of pneumonia, which he considers the prevailing type of the disease on the Island, [illegible] marked malarial symptoms manifested. "The lungs become hepatized with a burning fever, which was characterized by [illegible] Besides the remedies as yet suggested, as is often [illegible] with this disease, must be employed [illegible] against complications, the existence of the inflammatory process, [illegible] with [illegible] and [illegible] to which [illegible] is accompanied by [illegible] congestion, and the [illegible] generally [illegible] [illegible] [illegible]

of no small moment, and affords a pleasant relief from the intense heat of the skin and helps to keep that great depurative organ in a condition the better to perform not only its ordinary functions but the large increase of duty now incumbent upon it. The effervescing draught, spirit of mindererus, sweet spirits of nitre, Hoffmann's anodyne, Dover's powder and ipecacuanha are remedies of some importance, and may be administered with advantage by an election of cases, and if their exhibition be properly timed. Blisters are useful after the force of the exacerbation has been reduced in those cases where any considerable head, gastric or pulmonary difficulty remains.

Surgeon A. F. PECK, *1st New Mexico Mounted Vols.; Los Lunas, New Mexico, Sept.* 30, 1862: Intermittents are of the quotidian type; remittents approach very closely in character to continued fever. The cold stage, so well marked in the intermittent fevers of the different sections of the United States, is but slightly developed on this river (the Rio Grande) as far as I have observed; it amounts to no more than chilly sensations in different parts of the body, after which the stage of pyrexia supervenes and lasts for several hours, when the sweating stage begins and the fever declines. The tongue is heavily coated with a white fur; there is great thirst with sometimes nausea and vomiting; all disposition for food is lost; the breathing is hurried and often irregular, with feelings of weight and oppression in the epigastrium; the pulse is full, strong and frequent. The nervous system is much disordered; there are severe pains of a neuralgic character in the back, loins and extremities; the secretions are diminished, the skin being dry and hot and the urine scanty. In the course of a few hours the sweating stage makes its appearance, when all the febrile symptoms gradually abate. As it advances the skin becomes cool, the excitement of the circulation subsides, the headache disappears and the patient falls into a calm sleep, from which he awakens free from fever.

The symptoms of remittent fever differ in many particulars from those above enumerated: For several days previous to an attack the patient describes himself as feeling languid and weak, with pains in the body generally, epigastric uneasiness, deficiency of appetite, disordered taste and slight soreness in different parts of the body. This state of system continues until a regular paroxysm of fever makes its appearance, which continues with little or no abatement in the twenty-four hours. In many cases the only sign of a remission is a slight diminution in the fulness of the pulse, the frequency remaining the same, while the pains in the body may be less violent and the skin not so hot as a few hours before. The tongue, at first covered with a yellowish-white fur, in the course of two or three days assumes a dark and dry appearance in the centre with edges and tip very red; great thirst; intense pains, especially in the head and back; sometimes diarrhœa and at others constipation; urine scanty and very dark; respiration hurried and difficult; skin sometimes of a yellowish hue.

The treatment that I adopt for these two diseases, which are undoubtedly identical in character but different in intensity, is as follows: If the bowels are confined I give three or four compound cathartic pills or half an ounce of sulphate of magnesia; if there is diarrhœa, castor oil half an ounce with half a drachm of oil of turpentine to be taken at once. After the bowels are thoroughly cleansed I give fifteen to twenty grains of sulphate of quinine morning and evening. If the patient has fever the next morning I repeat the quinine, giving twenty grains of the sulphate rather than fifteen, as I find that this quantity answers much better, given at once, than a greater quantity in divided doses. By this method of administration its full sedative and febrifuge effects are produced. I never have known two, or at most three, twenty-grain doses of the sulphate (and often much less is required) fail in this valley to reduce the fever and produce complete convalescence. In a few cases I have thought it necessary to resort to alterative doses of mercurials combined with opium or Dover's powder at night to procure rest; and if the urine should be very deficient in quantity I give sweet spirits of nitre, half a drachm to a drachm, three or four times in the twenty-four hours. If there should be much prostration I give essence of beef with wine or brandy, as circumstances may dictate. Method of administering sulphate of quinine, with some of its attendant results: I never wait for an intermission or a remission; if the bowels are open I give it at once, in the height of the fever, in from fifteen to twenty-grain doses, and repeat if necessary in three or four hours. When the symptoms are of an alarming character I very often combine the sulphate with a cathartic and give both at once, and if in three or four hours no sedative impression is made I give an additional quantity. In ordinary cases I never have found it necessary to give more than two twenty-grain doses in the twenty-four hours, although I have seen many cases in which I have given double or triple this quantity with the very best results. The immediate results of the administration of the sulphate in large doses during the fever are so gratifying that I cannot refrain from noting some of them. In from one to three hours the sedative effects of the medicine begin to appear. The pulse, before full, bounding and rapid, now becomes soft, less frequent and more regular; the skin, that before was hot and dry, now begins to be cool and moist; the countenance, that was anxious and restless, now bears the marks of composure and rest; the respirations, that were hurried and oppressed, are now easy and free; the tongue begins to show signs of returning moisture; the urine becomes copious; and lastly, the whole nervous system is quieted and the patient enjoys sweet repose.

Surgeon M. D. BENEDICT, *75th New York; Santa Rosa, Fla., April* 3, 1862: We have had since March 1 a large number of cases of remittent fever, mostly of mild type, although a few have shown a stronger tendency to congestion. It seems like a fever of acclimation, and in its treatment quinine is our main dependence.

Ass't Surg. J. H. SCHEETZ, *47th Pa. Vols.; Beaufort, S. C., August* 31, 1862: Remittent fever, which prevailed to a considerable extent, was characterized by a daily exacerbation and remission. Most of the cases presented the following symptoms: A general feeling of lassitude for two or three days, with partial loss of appetite, followed by alternating chills and flushes of heat, cephalalgia, referred principally to the supraorbital regions, sharp and lancinating in character, but sometimes dull, aching and heavy; eyes generally suffused; skin sallow, hot and dry during exacerbation, moist and flaccid during remission; tongue coated; thirst; anorexia; pain in the back and extremities; bowels usually torpid, but in some disposed to looseness; tenderness over the right hypochondriac and epigastric

regular; nausea frequent and sometimes vomiting; pulse from 85 to 110 per minute; urine generally high-colored and occasioning frequent complaints of scalding.

The treatment found most beneficial was to administer a mercurial purgative in cases with torpid bowels; when present ten grains of ipecacuanha were added to the mercurial. After the evacuation of the intestinal canal quinine in five-grain doses was given four to six times daily. If nervous was treated with opium, or Dover's powder, alternating with the quinine.

Surgeon S. W. Stanton, 73d Ill. Vols.; *Memphis, Tenn., December 31, 1862*. Many cases of malarial disease were complicated with chronic bronchitis and hepatic derangement. The paroxysms in most of the cases were not distinct—occurring at a certain hour, and made up of distinct stages, as of chill, fever and sweating—but light chills, followed in a short time by flushes of heat, but without subsequent perspiration. The febrile action was not high: skin hot, dry, not burning; pulse frequent and often weak and small. A sense of great muscular prostration attended all these cases, progressive of the earlier, as was also common. They were treated with the usual remedies.

Surgeon J. L. Mulford, *48th N. Y. Vols.; Fort Pulaski, Ga., September 1, 1862*: The cases of malarial fever this month have been of a mild form. The symptoms are nausea and vomiting, great prostration, weakness, pain in the back part of the head, with a heaviness over the eyes, pain in the knees, pale or clay-colored stools, and slight pain in the liver. In all cases I think the difficulty arises from an inactive liver. The treatment has been mercurial purgatives and castor oil, followed by two-grain doses of quinine in aromatic sulphuric acid.

Surgeon E. Harrison, *Medical Director, 18th Army Corps; Camp in Florida, Miss., September 30, 1862*: I have observed a peculiar disease during the past month, beginning with a chill preceded for several days, and then characterized by a harsh, dry skin, dry tongue, feeble pulse, extreme debility, no appetite, generally a little fever each or several days, and with more of a tendency to mild putrid form of disease. After one or two weeks stupor in this condition the patients brighten up, but convalescence is very slow. I have classed these cases under the head of remittent fever, but the fever is seldom perceptible in the chill.

Asst. Surg. D. L. Huntington, *U. S. Army; Fort Monroe, Va., September 30, 1862*: The prevalent diseases have been those of intestinal origin and those depending on a deranged state of the portal circulation. The bilious fevers have been mild and easily managed. Intermittents have proved more obstinate, and in many cases have continued a long time, quinine having seemed to exercise but little of its peculiar power. In these cases a resort to Fowler's solution has been of great advantage. I have noticed a marked predisposition in these cases of intermittent disease, which I have attributed partly to the fact that the poison still remains in the system, though held in abeyance for the time, and partly to the enervating effects of the climate. It is proper to state that but little of the disease was originated here, as the command during the summer was for the protection of fortifications.

Surgeon A. W. Wainer, *76th Pa. Vols.; Suffolk, Va., November 1, 1862*: We have seen a number of cases of a peculiar type of malarial fever. A man would complain of a few trifling various symptoms for a day or two, doing light duty, when his associates would report him as crazy. In a day the following symptoms would be developed: Dry tongue; quick pulse, 110–120; slight heat of skin; good appetite; some tendency to diarrhœa; wildness of expression; nervousness; constantly moving about, lying down only when ordered to; embracing every opportunity to escape the care of nurses, and talking rationally, although occasionally mildly delirious. These symptoms lasted about two weeks, when the patient suddenly awoke to a consciousness of his condition. Convalescence was rapid. I had six cases of this kind, and all recovered except Private Putnam of Company G, who became insane and was sent to the Asylum at Washington. The disease sometimes assumed another form: The man would have a slight chill, then fever, quick pulse, hot tongue, violent nausea, peculiar trembling in fingers all over the body, great weakness of system, delirium, great prostration, and death in twenty-four to thirty-six hours. I had two such cases in Oak Grove Camp and lost one of them.

II.—The Pernicious Fevers.—In the form of sick report used during the civil war the term *congestive intermittent fever* was employed as the equivalent of the designations *pernicious intermittent fever, congestive fever* and *congestive chills*, to indicate that dangerous form of intermittent, characterized especially by the intensity and severity of the cold stage, which had long been recognized as of frequent occurrence throughout the malarious districts of our Southern States. Such attacks occurred not only in persons who were for the first time exposed to a highly malarious atmosphere, but also among those who had suffered more or less from the malarial influence before the supervention of the congestive seizure; indeed it is probable that a majority of the deaths recorded by our medical officers as from simple intermittents were really due to the occurrence of this pernicious type of the disease. It assumed various forms, one of which appears to have been observed with much frequency. In it were presented grave symptoms of disturbance of the brain and nervous system, manifested by headache, dizziness, coma, more especially convulsive phenomena and sometimes delirium, accompanied by pain [illegible] the back

nervous disorder manifested itself in the form of epileptiform convulsions, as observed by Surgeon GEORGE COOPER, U. S. Army, while Medical Director of the Department of the South.* In other instances unusual manifestations were recorded, as by Surgeon G. RUSH, 101st Pa. Vols., who published two cases of pernicious fever in which unconsciousness and insensibility were associated with so little disturbance of the organic functions that in the first case which occurred the patient was suspected of malingering.†

Frequently the severity and prolonged duration of the chill or of the condition of collapse that followed it, corresponded to what has been described as the algid variety of pernicious fever. Dr. WOODWARD‡ mentions having seen at the siege of Yorktown a number of cases in which the collapse was profound and extremely prolonged. In other cases congestion of the lungs appeared to determine the fatal issue. Although vomiting and diarrhœa were frequent concomitants of the simple intermittents and remittents, it does not appear that the concurrence of these symptoms, constituting a choleraic variety of the disease, was often observed in our pernicious cases. When the incidence of the disease fell on the intestinal mucous membrane profuse hæmorrhage was the more common result, as in the cases described in Surgeon MERRITT'S report submitted below.§ The hæmaturic variety of hæmorrhagic malarial fever, which has attracted so much attention in the Southern States since the close of the war, does not seem to have been observed among our soldiers. But in some of MERRITT'S cases intense jaundice, which, with blood in the urine, is regarded as the characteristic symptom of the hæmaturic variety, appeared in connection with the hæmorrhagic extravasations from the intestinal mucous membrane.‖ In other instances the hæmorrhagic tendency was shown by petechiæ and vibices. Dr. WOODWARD'S cases, which

* See the report of Surgeon COOPER, p. 231 of the Appendix to Part I of this work. Some of the cases referred to by Surgeon D. W. HAND, U. S. Vols., as occurring during the summer of 1863 in the 27th Mass. Vols., near New Berne, N. C., must also have presented marked cerebral symptoms, for he says: "I have reason to believe that some of these cases were mistaken for cerebro-spinal meningitis by the medical officers in attendance."

† In the Philadelphia *Med. and Surg. Reporter*, Vol. X, 1863, page 368: Private C., of Co. C, and private K., of Co. I, 101st Pa. Vols., who had presented nothing unusual during the night and previous day, were found on the morning of Sept. 25, 1863, in a state of insensibility. Both lay motionless and no movement could be excited in either of them; their temperature was natural "or perhaps a little higher;" their skin moist or perspiring; pulse 80, regular and moderately full; countenance placid. The eyes were open and looked natural, the pupils acting under the influence of light; they would follow an object moved before them, and away to a considerable distance, and close quickly when a sudden movement was made near and towards them. To restore the patients blisters were applied to the cervical and dorsal portions of the spine, and carbonate of ammonia and quinine were administered. For thirty-six hours they remained in this unmoved condition, the pulse meanwhile becoming weaker and the urine voided involuntarily. Beef-extract was given as nourishment. Two drops of croton oil were put on the tongue and copious dejections were followed by improvement in both cases. The hearing was somewhat restored, and when the men's names were loudly called they made muttering efforts to speak. Forty-eight grains of quinine were administered to private K. in twenty-four hours. He recovered. Private C. died fifty-two hours after the attack. *Post-mortem* examination found the brain and its membranes normal. Plymouth, North Carolina, where the regiment was stationed at this time, is surrounded by cypress swamps; 90 per cent. of the officers and men had been affected by miasmatic fevers.

‡ *Camp Diseases of the United States Armies*, Philadelphia, 1863, p. 174.

§ Page 142.

‖ The following sketch of hæmorrhagic malarial fever, as it appears in our medical literature since the war, is of interest in connection with Surgeon MERRITT'S cases: In the autumn of 1867 Dr. T. C. OSBORN, of Greensboro', Ala.—*New Orleans Jour. Med.*, 1868, XX, p. 644—observed ten cases of a variety of malarial fever characterized by chills, nausea and vomiting, followed by sudden bronzing of the skin and hæmaturia; five of these proved fatal, in some instances with suppression of urine and uræmic convulsions. In the recoveries convalescence was tedious. All the patients were thoroughly imbued with the malarial poison, having been subject to intermittent attacks for a long time before the development of these unusual manifestations. A few months later Dr. J. D. OSBORN, in an essay on Malignant Congestive Fever, read before the Greensboro' Medical Society and published in the *New Orleans Jour. Med.*, Vol. XXII, p. 61, added but little to the description of the disease already given by his father. But from his paper it is understood that the new disease had become epidemic, and that the country people called it yellow fever. His cases occurred during the period from September to April. About the same time Dr. H. C. GHENT, of Port Sullivan, Texas, in a letter published in the *Richmond and Louisville Med. Jour.*, Vol. V, p. 271, described the disease as it occurred in his part of the country in 1866–67, and from the recurring chills, blood in the urine and the name, black jaundice, applied to the disease, as well as its fatality and occurrence only in cachectic individuals, it is apparent that the new malarial fever of Greensboro', Ala., was endemic in certain parts of Texas. The next paper of importance which appeared was read by R. F. MICHEL, of Montgomery, Ala., before the Medical Association of the State of Alabama in March, 1869. In it he defines the disease as "a malignant malarial fever following repeated attacks of intermittent, characterized by intense nausea and vomiting, very rapid and complete jaundiced condition of surface as well as most of the internal organs of the body, an impacted gall-bladder and hæmorrhage from the kidneys. These phenomena presented themselves in an almost uninterrupted link, attended by remissions and exacerbations. It is a fever peculiar to the United States." In the record of an autopsy on a case of death from this disease, contributed by Dr. MICHEL, the brain was natural, its veins comparatively empty and its membranes jaundiced. The thoracic organs were yellow-colored but otherwise normal. The omentum and its fat were saffron-colored; the stomach filled with dark grumous bile and its mucous membrane thickened and injected, especially near the pylorus; the intestines normal. The spleen was firm and solid, weighed nineteen and a half ounces and was about three times its normal size. The liver was slightly enlarged, firm, solid and of a dark chocolate color; the gall-bladder was filled with an almost solid pasty pear-shaped mass, the smallest particle of which tinged a basin of water the color of saffron. The kidneys were enlarged and of a pale-reddish color, but dark-green on section. Dr. MICHEL embodied the impacted gall-bladder in his definition of the disease, but in subsequent cases it

were very fatal, presented these characteristics. Perhaps the depravation of the blood which gave origin to the petechial blotches was due, as suggested by him, to the concurrent action of a scorbutic taint; but this must be considered doubtful, for, as will be seen hereafter, these

was found to contain a dark green-black like the impaction in this case being only an aggravation of the usual condition: the spleen also has been found to be more frequently softened and filled with disorganized blood than firm and solid.

The new disease was attributed by J. D. OSBORN to the uncared-for condition of the country. Dr. WM. A. GREENE, of Americus, Ga., in the *Richmond and Louisville Med. Jour.*, 1872, Vol. XIII p. 49, in an article entitled Miasmatic Hæmaturia, speaks of the almost entire neglect of drainage consequent on the changed condition of agricultural pursuits since the war. Dr. NORCOM, of Edenton, N. C., in his address on Hæmorrhagic Malarial Fever, read before the State Medical Society in 1874, gave expression to similar opinions: "Before the war, the Southern States were in a high state of cultivation and the lands thoroughly drained, hence the malignant forms of malarial disease, as a general rule, were not known except in very low badly-drained swamp lands. Within the past eight years, owing to so much land lying waste, defective drainage and the general unsanitary condition of the country, the malarial poison has acted with intense virulence, and caused the disease we are now considering." In fact the morbid state was generally regarded as malarial in its origin, but no satisfactory explanation of its evolution was presented. Dr. E. D. MCDANIEL, of Camden, Alabama, considered this question in his article on Hæmorrhagic Malarial Fever in the Transactions of the State Medical Association, 1874, p. 297. He says: "Why should those localities which, years ago, showed the most unequivocal and extreme influences of malaria by annual autumnal visitations of congestive or pernicious intermittent, remittent and pseudo-continued malarial fevers, almost putrid in general intensity, have not, in those times, presented with considerable frequency and in considerable numbers cases of this now justly dreaded scourge? And why did those same localities, soon after the earliest November frosts, become in old times as healthful, so far as fevers were concerned, as mountain tops, while the insatiate malaria of to-day relentlessly pursues its bleeding victims in mid-winter, when the air is filled with snow-flakes and the forests are hung with icicles? And why are some places once so salubrious that they knew no malarial fevers at all, or if any, only the mildest intermittents, then popularly regarded as trivial and almost harmless, now not exempt from even this the direst of all malarial ills—the very summation of all extreme malarial manifestations? * * * * I have seriously pondered this whole subject, and I am fully convinced that the grave, new order of symptoms now occurring in malarial fever in Alabama and the adjacent States, even in localities not heretofore known as specially insalubrious, is not due to any marked increase in the quantity, intensity or extension of malaria; for with exception, perhaps, of 1867 and 1868, the average numerical manifestations of malaria have been fewer since the advent of the icterode hæmorrhagic period than they were before that period set in. Nor to any allotropic or otherwise modified condition of malaria, be this chemical or dynamical, or sporoid in its nature; nor to any marked deterioration of the blood and constitution due to depression of spirit or exhaustion of body, but to a *wide-spread* epidemic influence." It is to be regretted that none of the observers gave any consideration to the character of the water-supply in these virulent manifestations of malarial disease. The violence of the morbid action occurring at a time when exhalations from a malarious soil were not available in explanation, and the occasional appearance of two or more cases in the same household indicating a local cause, in the absence of contagious qualities, are facts suggestive of water-infection.

The publication of the articles which have been mentioned attracted the attention of the profession to the hæmaturic fever, and a number of papers on the subject have since appeared in the journals recording cases and discussing the pathology and treatment of the disease. But first it was denied that OSBORN'S new disease was a hitherto unobserved expression of malarial poisoning. Dr. J. C. FAGET, in the *New Orleans Med. Jour.*, 1869, p. 768, in reviewing MICHEL'S paper, called attention to the facts that this disease, although new to the majority of our Southern practitioners, had been described by DUTROULAU and other French authorities as occurring in the colonies in Madagascar, Cayenne and the West Indies, and that he himself in 1859 and 1864 had treated of Hæmorrhagic Paludal Fever, and specially of its hæmaturic form. The hæmatemesic variety, he contended, had been frequently seen in New Orleans, but had been generally confounded by medical men with yellow fever. Indeed, J. C. CUMMINGS, of Mobile, Ala., in the *New Orleans Med. News and Hosp'l Gaz.*, 1859-60, Vol. VI, p. 811, records six cases which differ in no respect from those afterwards described by OSBORN and others, and refers to the prevalence of the disease during previous seasons. NORCOM instanced MCLEAN'S article on malarial fevers in *Reynold's Practice* to show the familiarity of that writer with a hæmorrhagic variety of the disease. The cases which are described at length by our Southern brethren dwell upon the blood in the urine and in the serum which collects after the application of blisters; but other hæmorrhages appear to have been rare, although mention is occasionally made of bleeding from the nose, mouth and stomach. Dr. FAGET, as already intimated, considers that hæmorrhage from the stomach is a frequent expression of the morbid action. "And when I speak of large clots of blood, still red, let no one imagine that I then saw blood coming from the mouth, from the gums, swallowed, and, afterwards, ejected before undergoing the influence of the acid of the gastric juice. By no means. I beg that I may have the credit of examining things closely, and that I may not be charged with having committed an error of so grave a character." Hence Dr. F. endorses the lines used by MICHEL in defining the disease that its name of necessity becomes Hæmorrhagic Malarial Fever instead of Malarial Hæmaturia given by those whose field of observation had been restricted to the one hæmorrhagic manifestation. He says: "A malignant malarial fever, the result of frequent attacks of intermittent, or of a prolonged and exhausting remittent, characterized by hæmaturia, hæmatemesis, epistaxis, metrorrhagia, metrorrhagia or hæmorrhage from the gums and fauces, or from two or three of these at the same time; most distressing and incessant nausea and vomiting, and complete prostration of condition (generally yellow hue of body). The chill stage, though not always, is generally well marked, and the paroxysms almost recur about every ten or twelve hours, but far more frequently the fever is uninterrupted by intermission or remission." A few years later, in 1874, the work of BÉRENGER-FÉRAUD, *De la Fièvre Bilieuse Mélanurique des Pays Chauds comparée avec la Fièvre Jaune*, and in 1875, his description of *Melanuric fever* in his *Traité Clinique des Maladies des Européens au Sénégal*, show the existence of a disease which corresponds in its general features with the hæmaturic fever of our Southern writers, but which is attributed to the presence of a large quantity of biliary matters. Relying upon the accuracy of M. BÉRENGER-FÉRAUD'S observations and experiments, the writer of a review of his work in the *American Jour. Med. Sciences*, New Series, Vol. LXIX. p. 163, throws doubt upon the hæmaturia so frequently reported by our American practitioners, and suggests that they may have been deceived by the biliary coloring matters with which the system is so thoroughly pervaded. Dr. FAGET begged that he might have the credit of examining things closely. If our other observers did not emphasize in like manner it is probably due to the fact that they could not realize the importance of testimony as to blood in the urine would be questioned, constituting as this condition did, with the concurrent jaundice, the pathognomonic symptoms of the disease under observation. M. BÉRENGER-FÉRAUD regards melanuric fever as differing only from other expressions of acute malarial poisoning in the large and excessive secretion of bile replacing the more usual perspirations or choleraic discharges. Our American writers allow the presence of bile in the urine, as the whole system seems deluged with it, but they are positive as to the presence of blood, not only as manifested by a coloration due to the dissolved hæmoglobine of disorganized blood corpuscles, in which case the symptom is regarded as an effort to restore the blood to its normal constitution by the elimination of the debris of its destroyed corpuscular elements, but as shown by the presence of the red corpuscles themselves, and even in many cases by unmistakable blood-clots which must be regarded as the result of a true hæmorrhage from ruptured capillaries during a stage of active congestion. MCDANIEL regards the hæmorrhage as due to interrupted cutaneous action such as explains the hæmaturia in rheumatic, catarrhal and scarlatinal cases. The subject appears to require more light to be thrown upon the passage of blood from the system by the kidneys, and may be referred for explanation by Professor JOYNES in the *Richmond and Louisville Med. Jour.*, Vol. XXIII. p. 222, to the following from NIEMEYER'S chapter on Hæmatogenous Icterus in his *Text-Book of Practical Medicine*, Vol. I. p. 684: "The views regarding the occurrence of jaundice without retention of the excretion of bile have totally changed since the observations of VIRCHOW, KÜHNE and HOPPE-SEYLER have shown that bile-coloring matter may itself result from the free coloring matter of the blood without the action of the liver; and we may induce artificial jaundice in animals by injecting substances that dissolve the blood corpuscles. There is now no doubt that some of the formerly enigmatical forms of icterus are due to the disintegration of blood corpuscles and the transformation of the freed coloring matter circulating in the blood into bile-coloring matter. This is particularly true of the icterus which is occasionally caused by poisoning from chloroform or ether; for, as experiment proves, these substances possess the power of dissolving blood corpuscles. . . . . This mode of origin is very probable, though not absolutely proved, for other varieties of jaundice, as in that

blotches in fulminant malarial cases were found oftentimes in men who had been robust and healthy until struck down by the pernicious influence. Surgeon JACKSON, 11th Pa., Vols., in a report, hereafter presented, describes a number of cases which occurred in a command camped in and around Annapolis, Md., in the winter of 1861. Some of the regimental surgeons reported these cases under the head of *typhus fever*, others called them *spotted fever*. Surgeon JACKSON designated them at first as *malignant congestive fever*, and afterwards simply as *congestive fever*, and his reports indicate that he looked upon them as congestive intermittents modified by the overcrowded condition of the buildings occupied by his regiment as barracks. The petechial spots, the uncoagulated condition in which the blood was found in the fatal cases, and the early period at which *post-mortem* putrefaction set in, strongly favor the view that the disease was cerebro-spinal meningitis; but the absence during life of the usual brain symptoms of cerebro-spinal fever is opposed to this view. In many of the fatal cases the mind was clear to the last. Moreover the necropsies made by Surgeon JACKSON show that although the cerebral membranes were congested they were free from deposits of lymph or pus. It might be urged that winter is not the season at which cases of congestive intermittent fever would be likely to occur; but the statistics of the war show that as a matter of fact congestive intermittents did occur at all seasons of the year, and in JACKSON's own regiment as well as in other regiments in the vicinity, cases of ordinary intermittent fever were occurring side by side with the pernicious cases under discussion; as indeed ordinary intermittents were occurring during the same months in all parts of our armies. The dangerous hæmorrhagic fever since prevalent in the South is of frequent occurrence during the winter months. The cases observed by Dr. J. D. OSBORN, which formed the basis of his paper calling attention to the hæmorrhagic form, occurred between the months of September and April. Again, the mortality of the Annapolis cases does not correspond with the usual mortality of cerebro-spinal meningitis. The monthly sick reports of the 11th Pa. Vols. show that during January, 1862, there were 7 cases and 3 deaths in the regiment; during February 17 cases and 1 death; during March 2 cases and no deaths: in all 26 cases and 4 deaths. During the same period there were 13 cases of quotidian intermittent fever and 11 of remittent fever, one of the latter fatal. Surgeon JACKSON attributed the small number of deaths among his petechial cases after January not merely to the improved hygienic condition of the regiment, but to the fact that he had recognized the malarial character of the disease and resorted to the appropriate treatment.

occurring after snake-bites, in that observed constantly in yellow fever, quite often in recurrent (relapsing) fever, septicæmia and puerperal fever, and more rarely in other infectious diseases, and acute diseases accompanied by severe fever." Commenting on this extract Professor JOYNES remarks: "The destructive action of the malarial poison upon the blood-discs is so well proved that none will question it; and if we admit that under such intense and concentrated action of the morbific agent as that which induces an attack of hæmorrhagic malarial fever, this destructive effect is unusually rapid and extensive, the applicability of the above view to the icterus occurring in this disease becomes at once obvious, and the relationship between that symptom and the hæmaturia receives important elucidation." Recent researches have cleared away much of the difficulties that surrounded this subject. Thus, PONFIC—*Hæmoglobinuria—Berlin Klin. Wochen.*, 1883, No. 26—sustains by further experimental evidence the view that the destruction of the red corpuscles within the vessels is the essential element of the process. Having introduced blood dissolved by freezing into the veins of an animal, he found that the remains of the destroyed corpuscles were taken up by the spleen while the coloring matter was removed by the liver; but when there was an excess of hæmoglobine the kidneys participated in the excretion. When the blood has been so deteriorated that the action of these organs is insufficient to remove the detritus the patient becomes jaundiced by the metamorphosis of hæmoglobine into bilirubin within the current of the circulation.

The treatment adopted for the disease is based upon the recognition of its malarial causation. Quinine is given in free and repeated doses, by the stomach, if the gastric irritation can be allayed sufficiently for its introduction in this way, or failing this, by the rectum or hypodermic injection. Many practitioners consider an evacuant dose of calomel of advantage preparatory to the administration of quinine. NORCOM allays the vomiting by the hypodermic injection of morphine, and refers to the fears entertained by many lest the opium lead to suppression and uræmic convulsions, mentioning some cases where uræmic symptoms, which had already appeared, yielded after the exhibition of the morphine. BERENGER-FÉRAUD also approves of the use of opiates. Medication is seldom addressed specially to the hæmorrhage. But some writers have objected to the generally accepted methods. Thus McDANIEL urges as the first care of the practitioner in these cases the control of the hæmorrhage from the kidneys by the restoration of cutaneous action, which he endeavors to effect by the application of hot air and vapor-baths, &c., or by alternating these with cold affusions as stimulants to the general surface. He is doubtful as to the benefit to be derived from quinine, and instances the aggravation or recurrence of the hæmaturia under its influence. Other practitioners have also claimed that quinine was injurious. MALONE, in the *Mississippi Valley Med. Monthly*, Vol. I (1881), p. 62, while he does not believe that quinine will produce the disease, thinks that he has often seen it precipitate an attack in those predisposed. He regards the fever as due to the presence of a micro-organism, and claims great success for the hyposulphite of soda in thirty-grain doses with one fluid drachm of extract of buchu given every three hours.

III.—Chronic Malarial Poisoning.—Those soldiers who had been long exposed to malarial influences frequently became the subjects of a peculiar form of cachexia known as *chronic malarial poisoning* or *malarial cachexia*. It was generally observed in men who had already suffered from acute attacks of malarial disease, but it appeared also as a primary affection in those who had never been attacked by fever.* This chronic disorder was essentially an anæmia accompanied by more or less of hepatic disorder and enlargement of the spleen. The complexion was early modified, acquiring a peculiar yellowish pallor, which was usually unaccompanied by any icteroid tinge of the conjunctiva. The skin became dry and harsh, the lips livid and the tongue large, flabby, pale or of a faintly bluish tint, indented on the sides, and generally fissured on the dorsum, which was thinly covered with a whitish or yellowish coat. The patient lost his appetite and suffered from pains and aches in the bones and muscles, and frequently from neuralgia. In some, muscular debility was associated with tremors, which prevented the individual from assuming the erect position. Clonic movements and paralysis agitans are also referred to as having occurred. The patient became dull in mind, depressed in spirit, homesick, indisposed to undertake any work involving even slight exertion and unable to carry it out from physical disability. The heart appeared to be early influenced by the debility affecting the muscular system: probably many cases of sudden death were due to heart-failure.† At first the bowels were constipated, but generally, on account of the conditions of camp life, diarrhœa supervened and became very intractable.

That a notable alteration in the quality of the blood was one of the first results of malarial poisoning, was manifested by the anæmic appearance of the patients. This blood-change was intimately connected with the generally accompanying enlargement of the spleen; but the enlargement was not in all cases proportioned to the cachectic condition. In most instances the increase in bulk of the spleen could be detected by careful physical exploration, and in some it was very marked. Disorder of the liver and kidneys could also generally be discovered in these cases. In many, œdema of the feet and legs, and even ascites, appeared, due to organic changes in the viscera in some instances, but in others, in which no organic lesions could be discovered, the serous transudation must be attributed to the altered condition of the blood and the weakness of the circulation.

IV.—POST-MORTEM RECORDS AND PATHOLOGY OF MALARIAL DISEASE.

I.—Post-mortem Records.—A full history of the attack is seldom given in these cases, but such meagre notes when taken, were of the same general character as those already submitted in the clinical records. The tongue was coated or furred, dry during the fever, moist at other times, occasionally brown in color. Diarrhœa was a prominent symptom, but sometimes constipation was present, with anorexia, thirst, vomiting, jaundice and

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* Surgeon [illegible] U. S. Volunteers [illegible] says: "Malarious enlargement of the spleen, and the attendant or consequent [illegible], are frequently, and in some instances, persistent expressions of intermittent periodical or remittent fever in those long exposed to [illegible], and even in patients [illegible] it is to be expected that whilst the *spleen remains affected, so long* will the person [illegible] paroxysms of fever. These, however, are not by any means the most serious or obstinate cases of splenic cachexia; on the contrary, they are often more tractable and amenable to remedial measures than others apparently of a less formidable though more chronic nature, [illegible] manifestations, more generally, [illegible] in a marked form where no fever has previously occurred."

† Surgeon [illegible], U. S. 20th Massachusetts, in his paper cited *supra*, p. 119, says: "In August, 1862, a patient convalescing in my regimental [illegible] had recovered sufficiently to walk out of doors, by a mistaken order of his commanding officer, was stripped and [illegible] In the midst of the washing he fell back, gasped feebly a few times, and before I reached him, though near [illegible] He [illegible] regarded the fatal consequences as due to the inability of the enfeebled and enervated heart to overcome the check [illegible]."

abdominal pain. The pulse was frequent, ultimately becoming imperceptible. There were pains in the head, back and limbs. Delirium, cough, dyspnœa, hiccough, profuse sweats, involuntary discharges and coma led to the fatal result in remittent cases. Convulsions were occasionally regarded as the manifestation of a cerebro-spinal engorgement due to the malarial poison. The symptoms in some cases are of interest as suggesting the *ante-mortem* formation of heart-clot.

The autopsies in the nine cases, recorded below, of death from intermittent fever, show that the fatal result depended on congestion of certain of the internal organs, the hyperæmia in some instances leading to the formation of inflammatory products. No one organ appears to have been specially liable to injury by the malarial influence; for in one or more of these cases the brain, lungs, heart, stomach, intestines, liver, spleen and kidneys are reported healthy, while in others they were found in an abnormal condition, to which the symptoms observed during life may with propriety be referred. In case 53 the force of the disease-poison was expended on the lungs, causing fatal congestion, and although fever of a paroxysmal type had persisted for some time, and the symptoms had at one time assumed a typhoid character, no diseased condition was observed in the intestines; the stomach was normal and the liver healthy; the brain and spleen were not examined. As there is no clinical record in 54, the *post-mortem* appearances must be taken in connection with the diagnosis of intermittent fever. The stomach and intestines were healthy, as were the lungs, but the heart, liver and especially the spleen were markedly altered. The recurrence of aggravated paroxysms in 55 caused the patient to fall into an adynamic condition marked by sordes, imperceptible pulse, profuse perspirations, hiccough, stertor, insensible pupils and involuntary passages; and these symptoms were associated with congestion of the brain and left lung, pericardial adhesions, notable alteration in the liver and spleen and patches of congestion in the ileum. In 56, which presented diarrhœa, vomiting and jaundice, the small intestine was of a purple color, the stomach ecchymosed, the liver altered in color and the lungs congested in their posterior portions; but the brain, heart and spleen were normal. In 57, after the suppression of the paroxysms, the patient instead of recovering his usual health became morose, apathetic and ultimately comatose, while affected with cough and diarrhœa, symptoms which might be considered obscurely suggestive of typhoid fever or of that fever as masked by the presence of the malarial cachexia. But the autopsy revealed such indications of repeated congestion of the brain as might be conceived to account for the cerebral symptoms, while the intestines presented no other lesion than patches of congestion in the ileum and of black pigment in the sigmoid flexure; broncho-pneumonia and nutmeg liver were present, yet the spleen was normal. A special interest attaches to this case, as the manuscript bears, in Dr. WOODWARD's hand-writing, the words "Typho-malarial fever. *Note.*"—as indicating that it was intended to occupy a prominent place in the expression of his views regarding this fever. It seems evident, however, by a reference to the time which elapsed between the suppression of the paroxysms and the date of death, that there was no specific typhoid element in the case, else the agminated glands would have been found extensively ulcerated. Case 58 is from the clinical stand-point an undoubted typho-malarial fever, if such a fever is susceptible of diagnosis. A continued adynamic fever persisted after the suppression of the chills, but the intestines were not altered from the healthy condition. In 59 the necropsical record indicates that the force of the disease was expended on the lining membrane of the intestinal canal. In 60 there was latent

pneumonia, with heart-clot and affection of the liver, spleen and kidneys; and in 61 a coincidence of tubercular disease and malarial manifestations.

Case 53.—Private Thomas W. Parker, Co. F, 3d Md. Cav., was admitted from Prince street prison October 10, 1864. The patient stated that he had suffered for some time from regular paroxysms of ague. His condition on admission indicated great nervous depression. Quinine and whiskey were prescribed, and the bowels moved by compound cathartic pills. Six days later the fever assumed a typhoid type, but this was speedily followed by an improvement, the tongue becoming moist and clean, the pulse 85 and the skin natural. On the 21st, after having been unusually comfortable and even lively during the morning, he complained in the afternoon of dyspnœa, for which counter-irritants were applied, and as there was some cough, an expectorant mixture was given. At 5 P. M., after eating a good meal of bread and milk, he was suddenly seized with intense dyspnœa; in the course of half an hour convulsions set in, and he died shortly after. Stimulants, friction of the extremities, etc., were tried without effect. *Post-mortem* examination eighteen hours after death: Both lungs were much congested throughout, with the exception of a small portion of the anterior border of each; they contained no tubercles, nor was any other lesion observed in them. Nothing abnormal could be detected in the stomach or intestines. The liver was healthy. The other organs were not examined.—*Third Division Hospital, Alexandria, Va.*

Case 54.—Private Patrick Bradley, 17th Ind. Bat'y; age 25; was admitted October 11, 1862, with intermittent fever, and died November 9. *Post-mortem* examination: There were pleuritic adhesions on the left side; the pericardium contained four ounces of serum; the heart was enlarged and fatty. The stomach was normal; the liver greatly enlarged and congested; the gall-bladder distended and ulcerated near its duct; the spleen much enlarged, softened and infiltrated with pus in its upper part. The circular fibres of the colon were strongly contracted in its entire length.—*H. Pierce, Ass't Surg., 150th N. Y., Stewart's Mansion, Baltimore, Md.*

Case 55.—Private John McVea, Co. B, 10th U. S. Inf.; age 32; was admitted October 20, 1865, having been sick five weeks, first with diarrhœa for two weeks and afterwards with chills and fever. He had a chill daily at 3.30 P. M., for which five grains of quinine were ordered at 8, 10, 12 and 2 o'clock. During the paroxysms the patient's intellect was clouded and his replies delayed; he fainted on sitting up; passed his urine involuntarily; had pain in the head, back and limbs; the heart's action was tumultuous; the pulse too rapid to count, and most frequent at the commencement of the sweating. Some roughness of the heart-sounds were observed. The tongue was coated, dry during fever, moist at other times; the bowels were open. On the 22d the quinine was repeated, but the chill and fever recurred in a more aggravated form. The patient was very weak; had sordes on his teeth; pulse scarcely perceptible at the wrist; urination involuntary. Whiskey was given and mustard applied to the epigastrium. Next day he had hiccough, stertor, profuse sweats, vomiting of small blood-clots, dysphagia, insensible pupils and involuntary passages; crepitation was heard over the lower part of the left side of the chest. He died at 2.30 P. M. *Post-mortem* examination twenty hours after death: Right arm flexed and rigid; left arm flaccid. There was a quantity of serum in the ventricles of the brain; the brain-substance was of a darker ash color than usual, and sections presented many points of black engorged vessels. The right lung was healthy; the lower lobe of the left lung much congested, nearly hepatized. The pericardium contained three ounces and a third of light-pink serum; the apex of the heart adhered to the pericardium by a lymph-patch the size of a shelled almond; the right ventricle of the heart was unusually flaccid, the mitral valve thickened and of a dull yellow color. The omentum was thin and dark lead color. The liver weighed eighty-five ounces; it was of a dull slate color. The spleen was pulpy, weighed twenty ounces and a half. Some patches of congestion were observed in the ileum. The kidneys were large but healthy.—*Douglas Hospital, Washington, D. C.*

Case 56.—Private Leonard Bennett, Co. D, 199th Pa. Vols., was admitted June 30, 1865, suffering from intermittent fever. There was great emaciation with a yellow tinge of the conjuctiva and skin, anorexia, occasional vomiting, five or six loose passages daily and restlessness; the tongue was moist and slightly furred; pulse 70 and feeble. He died August 15. *Post-mortem* examination twenty-four hours after death: Body emaciated and rigid. Brain normal. Lungs intensely congested in their posterior portions. Heart normal. Liver of light color superficially, blackened anteriorly and below; bile yellow and granular. Spleen firm and of normal size; pancreas normal. Stomach presenting blood-spots in its mucous membrane. Small intestines generally discolored and very offensive; jejunum black or dark purple; ileum cherry-colored in its upper part, darker below. Kidneys large.—*Ass't Surg. George M. McGill, U. S. A., Hick's Hospital, Baltimore, Md.*

Case 57.—Private James Hight, Co. D, 23d Ohio Vols.; age 23; was admitted January 18, 1865, with tertian intermittent fever. He had chills at irregular intervals succeeded by profuse sweating; his intellect was unnaturally dull; he would not eat nor try to help himself though he appeared strong; he had no pain; pulse regular and compressible. The chills yielded readily to quinine, but he remained without appetite or energy. After the first week he declined gradually, becoming morose in disposition and absent-minded, and affected with cough and diarrhœa. On February 20 he was reported as emaciated and imbecile; he had no diarrhœa but passed his stools in bed. On March 1 he rallied so as to answer simple questions correctly; but he had dyspnœa, much expectoration and extensive crepitus in both lungs. On the 5th he became half comatose with quick short breathing, and died on the evening of that day. *Post-mortem* examination thirteen hours after death: Much emaciation; blister mark on back of neck. There was effusion under the cerebral membranes, which were not injected but pale; the arachnoid at the foramen of Bichat was thick, opaque and white; the ventricles were distended with serum; there was a cream-colored spot of softening, apparently covered by serous membrane, on the ventricular wall formed by the right corpus striatum; the middle commissure was remarkably firm, as it stretched out to nearly an inch in length and so remained without

breaking across; the substance of the cerebrum was hard, that of the cerebellum and cord soft. The anterior mediastinum was emphysematous. The bronchi in the right lung and in the lower lobe of the left lung, especially behind and below, were dilated, of a dark purple color and filled with a pus-like fluid, while the lung-tissue around them was here and there dark and solid, the affected lobes as seen from the surface being sunken and of a dark lead color. The heart contained a fibrinous clot. The liver was large and finely marked with nutmeg foliations; the spleen normal. There were patches of reddening along the ileum, and pigment patches in the sigmoid flexure.—*Third Division Hospital, Alexandria, Va.*

Case 58.—Horace Hill, a robust muscular man, age 25 years; colored; was admitted November 7, 1865, with quotidian intermittent fever; tongue yellow-coated; appetite poor; pulse during the intervals of the paroxysm 84, full and of good strength; bowels quite regular; urine scanty and of high color; no difficulty of breathing; no œdema of the feet and legs. After treatment for two days the chills left the patient, but a febrile pulse remained; two days later sordes appeared on the teeth and lips, and the tongue became exceedingly dry; mental torpor and slight delirium were manifested. There was fulness and slight tenderness on pressure in the right hypochondrium and greater precordial dulness than natural. Moderate vomiting took place about noon of the 13th, and in a few minutes the patient suddenly and unexpectedly died. *Post-mortem* examination sixteen hours after death: The right ventricle of the heart much dilated; spleen greatly enlarged and softened; liver much enlarged; kidneys fatty; other organs normal.—*Surgeon Edwin Bentley, U. S. Vols., L'Ouverture Hospital, Alexandria, Va.*

Case 59.—Private W. P. Jones, Co. M, 3d U. S. Art'y, was admitted September 5, 1863, and died on the 10th, of intermittent fever. *Post-mortem* examination twenty-four hours after death: Both lungs were congested and adherent. The heart was hypertrophied and coated on its exterior with a thick layer of adipose tissue. The liver was slightly enlarged, its concave surface congested and of a dark bluish color, which extended about one-eighth of an inch into the substance of the organ. The spleen was congested and dark colored. The intestinal canal contained a black mixture of coagulated blood and mucus; its mucous membrane was deeply congested and almost black.—*Act. Ass't Surg. J. A. Murphy, West End Hospital, Cincinnati, Ohio.*

Case 60.—Quartermaster-Sergeant William L. Billman, Co. H, 3d Pa. Art'y; age 38; was admitted January 22, 1864, with intermittent fever and died March 7. He was able to walk about up to the evening of his death: he was present at inspection, undressed himself and went to bed apparently feeling well. *Post-mortem* examination twenty-four hours after death: Both lungs were in the third stage of pneumonia; there were adhesions on both sides and three ounces of liquid in the left pleural sac. The pericardium contained four ounces of liquid. The aortic valves were thickened; on one of them was a considerable quantity of adherent fibrin; the left side of the heart contained coagula of fibrin. The liver was hypertrophied; the spleen large and soft: the left kidney much larger than the right, and the pelves of both kidneys contained pus. [No. 336, Medical Section, Army Medical Museum, is the heart from this case.]—*Act. Ass't Surg. B. B. Miles, U. S. A., Jarvis Hospital, Baltimore, Md.*

Case 61.—Private William T. Griffey, Co. G, 1st Conn. Cav.; age 23: was admitted January 12, 1864, with intermittent fever. He died April 7. *Post-mortem* examination: The right lung was tuberculous. The left pleural sac and the pericardium contained effused serum. The liver was enlarged and tubercles were diffused through its substance; it weighed four pounds ten ounces. The spleen was soft and friable; it weighed sixteen ounces.—*Act. Ass't Surg. B. B. Miles, U. S. A., Jarvis Hospital, Baltimore, Md.*

In the next case the intermissions disappeared and the patient became affected with remittent fever; yet the *post mortem* appearances did not differ from those already described. The stomach, lungs and kidneys had suffered, but the other thoracic and abdominal organs were not perceptibly altered.

Case 62.—Private Henry Morton, Co. E, 56th Mass. Vols. (colored): age 30; was admitted December 16, 1864, from field hospital, with intermittent fever. The paroxysms were checked by quinine, and the patient was soon able to walk about. About December 31 he had an attack of diarrhœa, which was readily controlled by astringents. A few days later his ague recurred, and persisted in spite of the administration of quinia. The disease assumed the pernicious form, the remissions being but slight; the respiration became hurried, and delirium setting in, he died January 9, 1865. *Post-mortem* examination: The left lung was congested. The mucous membrane of the stomach was of a dark yellow color and much softened. The kidneys were congested. No other abnormal appearances were observed. The brain was not examined.—*Act. Ass't Surg. F. Stoddard, L'Ouverture Hospital, Alexandria, Va.*

The twelve cases which follow are illustrations of remittent fever. In 63, the diagnosis, originally quotidian intermittent, was changed in the progress of the case to typhoid fever; but there was no diarrhœa during life, and no intestinal lesion was discovered at the necropsy; delirium was present, and there was an effusion of turbid serum in the ventricles and under the membranes of the brain. Delirium is mentioned as having been present in one other case, but in it the brain was not examined. The lungs were congested in two cases, 63 and 72, tubercular and splenified in one case, 69, and hepatized and infiltrated with pus in a fourth case, 73; in four cases they were unaffected; in one they were

not examined, and in three their condition is not stated. The heart does not appear to have been subject to notable alteration; it is reported as normal in six cases and in the others its condition is not stated. The stomach contained a muddy-green liquid in two instances, 69 and 70. In all the cases except 63 the intestines were more or less affected. In two, 68 and 74, both the large and small intestines are said to have participated in the morbid action; in five, 64, 65, 67, 70 and 72, in which the intestines are stated to have been congested, inflamed or ulcerated, it is probable that the large and the small intestine were both intended to be included in the statement, for in 71 the inference that the large intestine was affected is fully warranted by the phraseology—"the intestines were ulcerated, the ulcers in the small intestine being of large size." In 70 the mucous membrane of the intestine was in part almost gangrenous, the duodenum ulcerated and the peritoneum inflamed; in 73 the intestines were congested and the ileum extensively inflamed; in 66 the small intestine presented signs of inflammation, but the condition of the large intestine is not recorded; in but one, 69, of the twelve cases is it definitely stated that although the small intestine was congested the large intestine was in its normal condition; in none was there any affection of Peyer's glands, but the solitary follicles near the ileo-cæcal valve were prominent in one instance, the case last mentioned.

The liver is reported as normal in two cases; in a third case nothing is stated regarding its condition; in nine cases it is variously described as large, fatty, pale, fawn-colored, bronzed, soft, congested, etc.

The condition of the spleen was normal or not stated in six cases; it was enlarged, soft or dark colored in five cases, and contained a purulent collection in one case, 74.

CASE 63.—Sergeant Owen Crossman, Co. H, 28th Mich. Vols.; age 45; was admitted February 5, 1865. Diagnosis—quotidian intermittent fever, changed on the 8th to typhoid fever. He had suffered from chills every night for two weeks, but had none after his admission. He was much emaciated and depressed in mind; had a slight dry cough but with easy and natural breathing; uneasy feelings in the upper part of the abdomen; darting pains in the abdomen and thorax; anorexia; thirst; his skin was dry but covered at times with a clammy sweat; bowels regular. On the 14th he had profuse perspiration, delirium and involuntary passages. He died next day. *Post-mortem* examination twenty-two hours after death: Skin jaundiced. Much effusion under arachnoid at vertex; brain-substance quite hard, most of the vessels having yellow spaces between tracks of black fluid blood; lateral ventricles full of liquid; choroid plexus showing bulbs of yellow liquid about the size of peas along its posterior lower edge; locus niger very dark and broad. A little high-colored but clear serum in the pericardium; small yellow fibrinous clots in the heart. Right lung so congested posteriorly by hypostasis as to sink in water, soft, gray-colored and adherent to walls of chest by many white bands; left lung dark but crepitant posteriorly, firmly adherent. Liver pale and fatty; gall-bladder the size of a butternut; spleen very large and soft, anæmic; kidneys pale.—*Third Division Hospital, Alexandria, Va.*

CASE 64.—Private John Gavallence (command not stated); age 27; was admitted July 8, 1863, from Alexandria jail, having been sick six weeks with bilious remittent fever. From his delirious mutterings he was supposed to be a rebel deserter. He did not rally sufficiently to converse rationally, but died on the 12th. *Post-mortem* examination ten hours after death: Liver and spleen somewhat enlarged; Brunner's glands enlarged; mucous coat of intestines extensively inflamed, but with no ulceration.—*Act. Ass't Surg. A. P. Crafts, Third Division Hospital, Alexandria, Va.*

CASE 65.—Marcellas F. Dixon, citizen of Missouri; age about 20; was admitted December 6, 1864, with remittent fever. He afterwards had erysipelas, and on recovery from this was attacked with diarrhœa and laryngitis. He died January 28, 1865. *Post-mortem* examination four hours after death: There was a tough frothy mucus in the trachea and bronchi; the larynx did not exhibit definite signs of inflammation. The pericardium contained effused serum. The right lung was adherent. The bowels were congested but not ulcerated; the mesenteric glands were enlarged.—*Act. Ass't Surg. J. B. Young, U. S. A., Rock Island Hospital, Ill.*

CASE 66.—Sergeant Charles M. Gould, Co. M, 3d Va. Cav.; age 20; was admitted June 5, 1863, with remittent fever. Quinine was administered with apparent success, but during convalescence the patient being imprudent in his diet, was attacked with diarrhœa, and died June 22. *Post-mortem* examination six hours after death: The liver was fawn-colored. The spleen was soft and measured eight inches by five. The small intestine contained some undigested food and its mucous membrane was slightly inflamed.—*Third Division Hospital, Alexandria, Va.*

CASE 67.—Private William Cornog, Co. A, 51st Pa. Vols.; age 34; was admitted August 7, 1864, with remittent fever. He was very ill when admitted, and for three days before death, on the 18th, suffered constantly from sin-

gultus. *Post-mortem* examination: The lungs and heart were normal. The thoracic cavity contained four ounces of serum and the abdominal cavity four ounces and a half. The liver, spleen and pancreas were normal. The kidneys were large and white, weighing six ounces and a half each. The intestinal mucous membrane was slightly ulcerated.—*McDougall Hospital, Fort Schuyler, N. Y. Harbor.*

Case 68.—Private L. D. Johnson, 2d Ohio Battery, was admitted May 10, 1863, with remittent fever, having been sick since March. He died May 14. *Post-mortem* examination: Thoracic viscera normal. Liver large. Kidneys large, soft and fatty, weighing seventeen ounces. Mucous membrane of small intestine thickened and softened: large intestine congested.—*City Hospital, St. Louis, Mo.*

Case 69.—Private John Ingraham, Co. C, 17th U. S. Inf'y: age 23; was admitted November 23, 1863, with remittent fever. He died November 26. *Post-mortem* examination: Body not much emaciated; rigor mortis well marked. There was some venous congestion in the membranes of the brain. The right lung weighed thirty-three ounces; its upper lobe contained tubercles, some of which were cretefied, and beneath these a cavity the size of a horse-chestnut; the middle lobe was healthy: the lower lobe splenified. The left lung weighed twenty-four ounces; it was firmly bound to the thoracic parietes by old adhesions, which also obliterated the division of the lobes; the posterior portion of its lower lobe was splenified and contained some tubercular deposits. The bronchial glands were large and black. The right auricle of the heart was greatly distended by fluid blood; there were no clots in any of the cavities. The liver was bronzed and weighed fifty-two ounces; the gall-bladder contained twenty-five drachms of bile. The spleen was firm and of a dark mahogany color. The pancreas was quite white but not very firm; it weighed three ounces. The kidneys were very much congested. The stomach was enormously distended with a muddy-green liquid. The mucous membrane of the small intestine was congested throughout and intensely purple; the valvulæ conniventes were prominent; Peyer's patches were not elevated; the solitary follicles near the ileo-cæcal valve were conspicuous, their summits being of a deeper purple than the adjacent mucous membrane. The large intestine was normal.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 70.—Private Elias Henderson, Co. A, 10th East Tenn. Cav.; age 46: was admitted September 11, 1863, having been sick in camp five days. His skin was yellow, urine high-colored, bowels moved slightly three to five times per day, abdomen somewhat tender, especially in the right hypochondriac region; pulse 80 and weak. He was much prostrated, vomited very frequently, and ejected food almost as soon as taken. Hiccough came on next day and continued with jaundice, vomiting, abdominal pain and increasing prostration until death occurred on the 20th. *Post-mortem* examination ten hours after death: The heart and lungs were not examined. The stomach contained about six ounces of dark grumous liquid, and was highly injected near the pylorus; four inches below the pylorus an ulcer three lines in diameter penetrated the coats of the intestine, which contained in this locality about an ounce of sanious pus. The mucous membrane of the intestinal canal was inflamed and in some parts almost gangrenous. There was some peritonitis, evidently recent. The pancreas was enlarged and scirrhous; the spleen softened: the liver somewhat enlarged and its peritoneal coat inflamed: the gall-bladder filled with dark inspissated bile: the kidneys normal.—*Hospital No. 2, Nashville, Tenn.*

Case 71.—Private Dallas Sechler, Co. H, 92d Ill. Vols.: age 20: was admitted September 8, 1864, with remittent fever, and died on the 14th. *Post-mortem* examination on day of death: Lungs and heart normal; liver congested and softened: spleen eighteen ounces; kidneys normal; intestines ulcerated, the ulcers in the small intestine being of large size.—*Field Hospital, Chattanooga, Tenn.*

Case 72.—Private Francis Felton, Co. M, 9th Ohio Vols.; age 27: was admitted August 27, 1864, with remittent fever, and died September 23. *Post-mortem* examination on day of death: Lungs somewhat congested; heart, spleen and kidneys normal: liver pale and soft: mucous membrane of intestines congested, softened and showing many ulcers, large and small.—*Field Hospital, Chattanooga, Tenn.*

Case 73.—Private Orrin P. Tracy, Co. H, 3d Pa. Art'y; age 29: was admitted March 25, 1864, with remittent fever, and died April 8. *Post-mortem* examination: Extensive pleural adhesions on both sides; right lung infiltrated with pus; upper lobe of left lung hepatized: three ounces of effusion in pericardium: liver four pounds ten ounces and a half; left kidney ten ounces and a half, right seven ounces and a half, all normal in appearance. Intestines much congested and presenting extensive marks of inflammation in the ileum. No ulceration of Peyer's patches.—*Act. Ass't Surg. B. B. Miles, U. S. A., Jarvis Hospital, Baltimore, Md.*

Case 74.—Private H. H. Wade, Co. A, 18th Mass. Vols., was admitted August 7, 1862, in a dying condition, probably from malarial fever. Death occurred next day. *Post-mortem* examination: Body much emaciated. The heart and lungs were healthy. The liver was sound. The spleen was moderately enlarged and its substance natural in appearance except that a part of the organ was reduced to a thin sanious puruloid liquid forming an abscess about as large as a goose's egg. This abscess was in contact with the diaphragm, the left extremity of the stomach and the edge of the left lobe of the liver, and was separated from the peritoneal cavity by adhesion of the spleen to the parts mentioned. The stomach was exceedingly contracted but healthy. The mucous membrane of the ileum and colon was inflamed, but the agminated glands were natural.—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

In the six cases, 75–80, the fever became complicated with dysentery, pneumonia, pericarditis or peritonitis. The brain was healthy in the only case in which it was examined. The heart was natural in two cases and unnoted in the others. In three the mucous membrane of the intestines was congested or ulcerated: in one the duodenum and

pancreas were ulcerated. The stomach contained a mud-like liquid in two cases, 75 and 79, and its mucous membrane was thickened and slate-colored in one case, 80. The spleen was normal in one, unnoted in three, and enlarged in two cases. The liver was affected in three cases and unnoted in the others.

Case 75.—Private Asa L. Patten, Co. I, 144th Ohio Vols.; age 24; was admitted February 6, 1865. Bilious malarial fever, with dysentery. Died February 8. *Post-mortem* examination six hours after death: Body very much emaciated. Heart containing a large fibrinous clot; liver enlarged; stomach distended with almost half a gallon of a dark grumous liquid; intestines congested and ulcerated; blood watery and degenerated—*Act. Ass't. Surg. W. Bryan, Stanton Hospital, Washington, D. C.*

Case 76.—Private Michael McCuskey, Co. F, 9th Ohio Cav.; age 18; was admitted February 22, 1864, with remittent fever, from which he recovered but remained weak and did not leave his bed. On March 25 pleuro-pneumonia set in, and death occurred on the 30th. *Post-mortem* examination seventeen hours after death: The lower lobe of the left lung was hepatized, exuding a red frothy liquid on section; the lower lobe of the right lung was hepatized; the right lung was covered with unorganized lymph; each pleural cavity contained twenty ounces of reddish serum. The heart was healthy; the liver presented the nutmeg appearance; the spleen and kidneys were large and congested; the mesenteric glands enlarged.—*Hospital No. 8, Nashville, Tenn.*

Case 77.—Recruit Casper Christenson, 66th N. Y. Vols.; age 40; was admitted March 7, 1864, with remittent fever, for which quinine and brandy were given, but he did not improve. Two days before his death his left leg and ankle became enormously swollen and painful, and next day the right leg became similarly affected. He died March 18. *Post-mortem* examination forty-eight hours after death: There were old pleuritic adhesions on both sides. The pericardium contained about two ounces of bloody serum, and there were other evidences of recent pericarditis. Some old ulcers were observed in the intestines.—*Third Division Hospital, Alexandria, Va.*

Case 78.—Private Uriah K. McFarland, Co. E, 4th Ind. Cav.; age 36; was admitted July 24, 1863, with chronic diarrhœa. He recovered and was doing light duty, when on December 25th he was attacked with remittent fever. He improved after the use of quinine for three days; his appetite returned and he was able to walk about, when, on January 5, 1864, the chill recurred and was followed by fever; bowels somewhat constipated. Three compound cathartic pills were given at once, and the quinine was again resorted to in six-grain doses. Next day he had a burning pain in the epigastrium, increased by pressure and deep inspiration, incessant nausea and vomiting, a white furred tongue, feeble pulse, 130, and short and hurried respiration. Morphia and warm fomentations were employed. On the 7th small and repeated doses of calomel and opium were given, and a blister was applied to the epigastrium, but the vomiting continued, and on the 8th hiccough, restlessness and great anxiety were added to the symptoms. On the 9th delirium supervened and the extremities became cold. He died next day, the vomiting and hiccough having ceased for some hours before death. *Post-mortem* examination eighteen hours after death: The peritoneum was much thickened; the omentum adhered to the intestines and anterior wall of the stomach; the serous coat of the large and small intestines was disorganized; the coats of the stomach were thickened; the spleen was twice the normal size, softened and friable.—*Hospital, Madison, Ind.*

Case 79.—Private Samuel Clancy, Co. B, 1st N. Y. Vols. Admitted July 26, 1862. Diagnosis—pernicious fever. Died August 1st of peritonitis. Shortly before death this man vomited a considerable quantity of a dark olive-brown, muddy liquid. *Post-mortem* examination: The peritoneum was inflamed throughout its whole extent. Pseudo-membrane was found on the intestines, but they were not agglutinated. The stomach contained about a pint and a half of the mud-like liquid above mentioned. The mucous membrane presented a small patch of inflammation, but elsewhere appeared neither softened nor otherwise unhealty. The mud-like liquid, examined microscopically, exhibited an abundance of epithelial cells but no distinct appearance of blood.—*Act. Ass't Surg. J. Leidy, U. S. A., Satterlee Hospital, Philadelphia, Pa.*

Case 80.—Private Lewis T. Fisher, Co. K, 149th Pa. Vols.; age 20; was admitted March 26, 1864. Diagnosis—remittent fever. Died April 25. *Post-mortem* examination nine hours after death: Brain, lungs and heart healthy. The mucous membrane of the stomach was thickened and slate-colored. The intestines were much congested, and their serous coat, which was of a slate-blue color, was adherent to the abdominal walls. The upper half of the duodenum was extensively ulcerated and almost perforated in some places. The liver was much softened in the neighborhood of the gall-bladder; the spleen firm and healthy; the pancreas somewhat ulcerated along its attached surface. The left kidney was enlarged and much congested.—*Lincoln Hospital, Washington, D. C.*

Typhoid symptoms are spoken of in the two cases which follow, accompanying in the first case a relapse which was complicated with inflammation of the parotids, and in the other a pneumonic abscess; but in neither does the *post-mortem* record indicate the presence of an affection of the patches of Peyer.

Case 81.—Private Adam Hauser, Co. G, 38th N. Y. Vols.; age 25; was admitted October 14, 1862, with remittent fever, which assumed a typhoid form, with dry tongue, diarrhœa and low delirium. During convalescence a relapse occurred, accompanied by inflammation and suppuration of the parotid glands. He died November 21. *Post-mortem* examination eighteen hours after death: Extreme emaciation. The lungs were healthy. The pericardium contained about four ounces of serum. Nothing abnormal was noted in the liver; the gall-bladder was moderately

filled with bile. The spleen was enlarged and softened. The intestines were distended with flatus: their peritoneal coat was highly injected and their mucous coat softened. The kidneys and bladder were healthy.—*Third Division Hospital, Alexandria, Va.*

Case 82.—Private Louis Buckmyer, Co. I, 37th Ohio Vols., was admitted October 24, 1862, with chronic diarrhœa terminating with symptoms resembling those of typhoid remittent fever. He died November 13. *Post-mortem* examination: Body extremely emaciated. There were pleuritic adhesions on the left side posteriorly, and an abscess of considerable size in the lower lobe of the right lung. The liver was enlarged. The mucous membrane of the small intestine was injected, softened and ulcerated.—*Third Division Hospital, Alexandria, Va.*

In the next case the patient, during convalescence from an attack of intermittent, appears to have been taken with true typhoid fever, developing diarrhœa and rose-colored spots at the end of the second week and ending fatally on the sixteenth day. The mucous membrane of the small intestine was ecchymosed and the agminated glands enlarged but not ulcerated.

Case 83.—Corporal William T. Reeves, Co. L, 10th Ky. Cav., was admitted April 23, 1863, with intermittent fever. He had an attack of hiccough which continued for three days with but short intermissions; but he speedily convalesced under anodynes and quinine, and on May 10 was up and walking about the ward. On the 12th he was seized with colicky pains, which, on the two following days, became very severe, but were relieved by cathartics and opiates. From the 16th to the 20th he complained of headache and had considerable irregular fever. By the 24th diarrhœa had developed, with tenderness of the bowels and some mental confusion. Next day the tongue became dry, and on the following day glazed; stupor had set in, and there was tympanites of the abdomen with gurgling under pressure and an eruption of rose-colored spots, well marked, over the whole of the body. He died on the 27th after copious perspirations, great prostration and increased stupor. *Post-mortem* examination twelve hours after death: The rose-colored spots, which were very numerous on the trunk and also on the limbs, presented a purpuric appearance. The small intestine was mottled with purple, and there were two or three spots which seemed ready to slough; Peyer's glands were enlarged and inflamed but not ulcerated. The spleen was very large; the liver and the thoracic viscera healthy.—*Act. Ass't Surg. J. B. Smith, Washington Park Hospital, Cincinnati, Ohio.*

In the next case the patient, during the debility consequent on intermittent attacks, became sick with fever which proved fatal about the seventeenth day, the tongue in the meantime becoming dry, brown and fissured and the teeth covered with sordes. Peyer's glands usually become ulcerated at an earlier period of the disease than this; but, as in the last case, death on the sixteenth day did not give ulceration of the patches as a *post-mortem* lesion although the disease was apparently enteric fever, it is probable that the poison was present in this case also; and in this connection it may be inquired if the occasional deposits of tubercle recorded as discovered in the ileum were not typhoid enlargements of the agminated and solitary glands. In 85 the relapse, which was accompanied with typhoid symptoms, may perhaps be regarded as an attack of enteric fever.

Case 84.—Private James Coady, Co. B, 24th Vet. Res. Corps; age 21; was admitted February 2, 1865, with debility from malarial disease. The patient had a haggard look, but complained of nothing but weakness and inability to sleep; his tongue was slightly coated with white fur, bowels somewhat loose, pulse 90, skin natural. He said he had recently suffered from intermittent fever. Wine-bitters and quinine were given, with Dover's powder at night. He slept well during the following night, but in the morning he was feverish, his tongue dry and brown in the centre, his bowels loose, and he complained of pain in the right iliac region; there was also some cough, with pain in the right breast and dulness on percussion over the upper third of the right lung. Acetate of ammonia and brown mixture were given and the quinine continued. During the next few days the typhoid symptoms became more marked; deafness, fissured tongue and sordes. Milk-punch was ordered. He died on the 19th. *Post-mortem* examination: There were old pleuritic adhesions on both sides, but particularly on the right. The right lung was infiltrated with tubercle, some of which was softened, and there was some intercurrent pneumonia; the mucous membrane of the bronchial tubes was thickened and of a dark-purple color. The liver was large and somewhat cirrhosed; the spleen dark-brown and soft. There were patches of inflammation and occasional deposits of tubercle in the ileum. The mesenteric glands were enlarged.—*Third Division Hospital, Alexandria, Va.*

Case 85.—Private John Herman, Co. F, 59th N. Y., was admitted September 9, 1864, jaundiced; convalescing from remittent fever. He was up for several days, but a relapse occurred and the disease assumed a typhoid character. Diarrhœa set in with much fever and tenderness over the abdomen. Death, on October 16, was preceded by low delirium, involuntary stools and retention of urine. *Post-mortem* examination: Lungs healthy; heart loaded with fat; liver of proper consistence but abnormally yellowish-brown; intestines injected with blood; Peyer's patches somewhat diseased but only slightly ulcerated; kidneys congested.—*Act. Ass't Surg. Henry Gibbons, jr., U. S. A., Douglas Hospital, Washington, D. C.*

In 86 a reference is made to typhoid symptoms, and the necropsy appears to have been held with the intent to discover whether these clinical features were dependent on enteric fever. The cases 87 to 91 are apparently of a similar character; no mention is made of typhoid symptoms, but the anatomical lesions in the small intestine differ from those above described as present in malarial fever and agree with those found in 83, in which enteric fever seems to have seized upon a convalescent from malarial disease. Although these cases appear to indicate that many others giving a record of typhoid symptoms were probably of an enteric nature, it may be noted, on the other hand, that, in cases 53, 55, 57, 58, 63, 64, 81 and 82, these symptoms were apparently unconnected with a specific lesion.

CASE 86.—Charles Lassell, Co. L, 14th N. Y. Heavy Art'y; age 28; was admitted June 15, 1864, with remittent fever. On the 20th typhoid symptoms, including diarrhœa, were developed, and he died on the 22d. *Post-mortem* examination twenty hours after death: Some of Peyer's patches were enlarged and some inflamed, but none ulcerated. —*Third Division Hospital, Alexandria, Va.*

CASE 87.—Private George Williams, 4th Mich. Vols.; age 19; was admitted August 10, 1862. Remittent fever. Died August 11. *Post-mortem* examination next day: The body was much emaciated. The thoracic organs were healthy. The spleen exhibited a remarkable number of the so-called Malpighian bodies, which were of uniform size, white and about the size of yellow mustard-seed. The liver, stomach, kidneys and pancreas were healthy. The mucous membrane of the intestines was more or less inflamed throughout, the redness being moderate; the glands of Peyer and the solitary glands were more than usually prominent:—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

CASE 88.—Private Ananias Spangler, Co. K, 204th Pa. Vols.; age 19; was admitted October 28, 1864, with remittent fever and died November 9. *Post-mortem* examination nineteen hours after death: Body emaciated; rigor mortis marked; suggillation posteriorly; muco-purulent matter escaping from nostrils; large but superficial abscess in perinæum. The pharynx and œsophagus were normal. The larynx and trachea were filled with muco-purulent matter, but the mucous membrane was healthy. The right lung was adherent to the thoracic parietes by recent lymph; its posterior portions were infiltrated with pus. The left lung, heart and pericardium were healthy. The liver was darker in color than usual, but was otherwise healthy; the gall-bladder contained six drachms of bile. The spleen, pancreas and kidneys were normal, as were also the stomach and the greater portion of the small intestine. The lower part of the ileum presented three or four ulcers which appeared to be in Peyer's patches; but the patches were not thickened and the ulcers seemed to be healing. The colon and rectum were normal.—*Act. Ass't Surg. Thomas Bowen, Second Division Hospital, Alexandria, Va.*

CASE 89.—Private Charles Reed, Co. C, 185th N. Y. Vols., was admitted January 17, 1865. Diagnosis—remittent fever. Died on the 21st. *Post-mortem* examination: The right lung weighed thirty-two ounces: its upper lobe was adherent and hepatized; the left lung weighed twenty-five ounces and had a slight tubercular deposit near its apex. The heart weighed ten ounces and was healthy; the liver seventy-six ounces, pale; the spleen twenty-four ounces, soft; the stomach was injected in spots and had one ulcer on its posterior wall; the duodenum and jejunum were healthy; the ileum thickened; Peyer's patches and the solitary follicles enlarged and thickened; the solitary follicles of the colon enlarged and infiltrated; the mesenteric glands much enlarged; the kidneys normal, each weighing six ounces.—*Act. Ass't Surg. H. Loewenthal, U. S. Vols., Fifth Army Corps Field Hospital, Army of Potomac.*

CASE 90.—Private Perley J. Blodget, Co. H, 5th Wis. Vols.; age 21; was admitted October 17, 1864. Diagnosis—remittent fever. Died November 1. *Post-mortem* examination forty-eight hours after death: Eight ounces of serum in right and two ounces in left pleural sac, one ounce in pericardium and a pint in the abdominal cavity. Spleen soft, dark, weighing about two pounds; liver and kidneys normal; Peyer's patches in the lower ileum, and the solitary follicles in the cæcum and upper colon much thickened and ulcerated; mucous membrane of colon inflamed. —*Second Division Hospital, Alexandria, Va.*

CASE 91.—Private Peter Blair, Co. I, 125th Ohio Vols.; age 21; was admitted November 17, 1863. Intermittent fever. Died December 9. *Post-mortem* examination eighteen hours after death: Slight emaciation. Lungs healthy; heart nine ounces, valves slightly thickened; liver fifty-nine ounces, healthy; gall-bladder large and distended with bile; spleen fourteen ounces; kidneys seven ounces each, normal; stomach healthy; Peyer's patches much thickened, some ulcerated; large intestine presenting a few superficial ulcers.—*Hospital No. 1, Nashville, Tenn.*

The five cases which follow come under the heading of *congestive chills*. In 92 the patient died comatose from cerebral congestion; but the liver, spleen and lungs were also affected and the blood was diffluent. In 93 the œdema and congestion of the abdominal viscera must be regarded as the result of the malarial influence, for, had the condition of the heart been responsible for them, the right lung would not have been reported as healthy. Violent convulsions took the place of the chill in 94. In 95 the fatal chill was accompanied with difficulty of breathing; but the *post-mortem* record declares the brain, lungs,

liver, stomach, intestines and kidneys of normal size and perfectly healthy; the spleen was enlarged and there was a thrombus in the right auricle. Whether the heart clot was concerned in the production of the fatal seizure is uncertain. But in 96 death apparently resulted from the formation of fibrinous clots in the cavities of the heart. They probably originated during the chill, when a tendency to stasis in the heart, increased by the incompetency of the valves, gave opportunity for their deposit. The muffling of the heart-sounds must be referred to an internal obstruction, since there was no excess of liquid in the pericardium nor other external condition to account for it. The other symptoms described are consistent with the theory of the *ante-mortem* formation of the clots in this instance.

Case 92.—Private Henry Wolfus, Co. I, 187th N. Y. Vols.; age 25; was admitted May 10, 1865. Diagnosis—intermittent fever and cerebral congestion. The patient was quite cold and comatose; pulse irregular; respiration noisy. There was no dulness on percussion except over the posterior and lower part of the left lung. Warmth was applied to the feet, cold to the head and a large stimulating enema was administered. He died next day. *Post-mortem* examination eleven hours after death: Lower lobe of right lung hepatized; liver congested; spleen congested and softened; venous blood diffluent; cerebral sinuses and veins turgid; three ounces of serum in arachnoid.—*Slough Hospital, Alexandria, Va.*

Case 93.—Stephen McLaughlin, who was discharged from 2d U. S. Art'y August 17, 1865, on account of premature old age, asthma and general debility from twenty years' service, was admitted September 11, confused in mind and with tremors of the limbs and voice; pulse 136; he appeared to have been drinking to excess. His legs were œdematous; abdomen full, tense and fluctuating; auscultation disclosed roughness of the heart-sounds with increased impulse, the sounds being heard all over the left side; there was absolute dulness from a little below the nipple to midway between that point and the crest of the ileum; the respiratory murmur was absent at the base of the left lung, puerile at its summit and on the right side; the left side of the chest was contracted, the right side enlarged. At 2 P. M. on the day of admission he experienced a severe chill, for which brandy and quinine were given and mustard applied. He recovered, but the chill recurred at 2.30 P. M. on the following day and he died at 7 P. M. *Post-mortem* examination seventeen hours after death: Body bloated; skin of the head dark and livid; a thick greenish liquid flowing from the mouth. The brain was normal. The right lung was healthy. The left pleural cavity was partly obliterated by adhesions, but contained in its sacculi serum and lymph; the lung was diminished to half its size, the lower lobe being very friable and having its air-cells filled with a prune-juice liquid. The pericardium contained four ounces of serum. The heart weighed fourteen ounces and a half; the ventricle was hypertrophied, the middle valve somewhat thickened and the curved margins of the pulmonary and aortic valves hardened. The liver was enlarged and softened; the spleen, weighing twenty-two ounces and a half, was pulpy. The peritoneum was darkly injected and contained ten ounces of serum. The stomach and intestines, which were much distended with gas, had their mucous lining congested. The kidneys were nodulated on the surface and contained several cysts somewhat larger than a pea.—*Douglas Hospital, Washington, D. C.*

Case 94.—Private Otto Ziegera, Co. G, 1st U. S. Vet. Vols.; age 25; was admitted September 13, 1865, and died September 19. He stated that he had been suffering from remittent fever. On admission his skin was of natural temperature and perspiring freely, but he had headache and his appetite was poor, tongue furred, pulse intermittent and countenance anxious. In four days he had improved so much as to be able to walk about. On the 17th he was said to have had a violent convulsion, which was considered as a congestive chill by the attending medical officer, who found the patient next morning collapsed, almost speechless, and covered with a profuse cold perspiration. During the day he rallied, but on the morning of the 19th he had another violent convulsion and expired in an hour.* Previous to death he had been eating watermelon and boiled eggs. *Post-mortem* examination eight hours after death: Rigidity marked. The arachnoid was opaque and presented numerous white spots of small size, chiefly over the

* A case in which the fatal chill assumed convulsive features is given by Act. Ass't Surgeon HENRY M. LYMAN, U. S. A., as having occurred in Hospital No. 2, Nashville, Tenn. The patient was admitted June 26, 1862, having the appearance of being well nourished; but at the same time there was an unusual paleness of the tongue and palpebral conjunctiva. Prior to admission he had complained continually of rheumatism and debility. Quinine and iron were prescribed. During the two weeks following his entrance into hospital he was twice attacked by malarial fever, which was readily suppressed by quinine. On July 17 he began to suffer much from pains which he called rheumatic, and at the same time his surface was covered with a fœtid perspiration; the latter continued through the day and following night. A scruple of Dover's powder was given during the day, and next morning a scruple of quinine was administered. After this he continued well until the night of the 23d, when the fœtid perspiration again appeared and lasted through the following day. Ten grains of Dover's powder every four hours were "ordered till the cessation of the fœtor." Quinine was again prescribed; but whether it was taken or not was uncertain, because of the prejudice of the patient against the remedy. Subsequently he expressed himself well until the 27th, when he complained of pains in his limbs, of a burning sensation in his stomach such as he never felt before, and of insatiable thirst. A scruple of quinine was prescribed for him, which, however, he did not take. He walked about the ward conversing with his comrades and presented nothing unusual in his appearance. He lay down on his bed and was soon seized with convulsive movements of the feet, arms and head, and stertorous breathing with frothing at the mouth; his surface grew purple and he died in a few minutes. The *post-mortem* examination, five hours after death, found considerable serous effusion under the arachnoid and about four ounces of fluid at the base of the brain, with much softening on the lower surface of its middle lobes. The lungs were healthy; the pleura presented nothing of any importance; the heart was normal; in the right ventricle was found a small white clot; the left ventricle was empty and contracted and the right auricle enormously distended with black fluid blood. Five ounces of clear serum were contained in the pericardium. The duodenum externally exhibited a pinkish hue; the ileum and colon were of a darker appearance. The spleen was normal in size and of a slate color, and the liver of a dark chocolate hue. Everywhere throughout the body the blood was found uncoagulated. This case of congestive fever was presented in the Second Part of this work, p. 239, as Case 776 of the diarrhœal and dysenteric series.

sulci on the right side of the cerebrum: the pia mater was congested. The substance of the brain was of normal consistence: it presented many puncta: the lining membrane of the lateral ventricles was opaque, but the cavities contained no serum; the floor of the fourth ventricle was congested and showed some small ecchymoses. Both lungs were marked in spots with melanic matter, the foreign substance of which could be felt in passing the finger over the pleura covering it: the right lung was congested by hypostasis posteriorly and inferiorly, and the substance at the summit of the left lung was puckered, firmly indurated and of the same specific gravity as water. The heart contained loosely-formed black clots. The liver was normal in specific gravity and consistence: the spleen enlarged, soft, flaccid, weighed fifteen ounces: the pancreas was large: the kidneys and suprarenal capsules normal. The ileum and lower portion of the jejunum were colored yellow with bile: the large intestine presented internally a blackish color which was not associated with softening, ulceration or any appreciable lesion.—*Geo. M. McGill, Ass't Surg., U. S. A., Hicks Hospital, Baltimore, Md.*

Case 95.—Private David Calvin Legrone, Co. D, 40th Ala.; rejected frontier man: age about 23: was reported on the morning of the 6th of December, 1864, as having intermittent fever. Five grains of quinine were directed to be taken night and morning. Next day he had no fever and made no complaint, remaining up till 9 P. M. He then went to sleep, but in about two hours awoke with a chill and difficulty of breathing and died in about half an hour. *Post-mortem* examination sixteen hours after death: The brain, lungs, liver, stomach, bowels and kidneys were of normal size and perfectly healthy. There was a tumour in the right testicle of the latter and about three or four ounces of serum in the pericardium. The spleen was about twice the usual size and very soft, dark colored and engorged with blood.—*Ed. Int. Surg., W. B. Matthews, U. S. A., Ford Island Hospital, N.*

Case 96.—Private George Evans, 6th Kansas Cav. (a Delaware Indian), weight 180 pounds, was admitted February 26, 1865, with a large ulcer, of several years' standing, on the right leg. This healed readily under treatment with ointment of carbonate of zinc and adhesive strips. The patient, however, was taken on March 14 with a severe chill which, lasted several hours, and was followed by fever, with a full and bounding pulse, 120, dyspnœa and great anxiety of expression. The fever gradually abated and with it the force and frequency of the pulse; but frequent palpitations supervened with consequent loss of sleep. Next morning the pulse was so small and frequent that it could not be counted: there was a suffocating feeling at the præcordia, with a pain which extended to the left shoulder: the countenance continued distressed: the dyspnœa increased: frequent vomiting of greenish matter occurred throughout the day: the sounds of the heart were muffled and indistinct: the bowels open and stools healthy: the urine normal: the skin moist and warm: the intellect clear. The pulse became imperceptible at the wrist and death took place at 3 A. M. of the 16th, forty-two hours after the accession of the chill. The treatment consisted of five grains of quinine every three hours, with opiates, Hoffmann's anodyne, nitrate of bismuth and mustard cataplasms. *Post-mortem* examination thirty-five hours after death: Rigor mortis well marked. The lungs were healthy throughout. The pericardium contained one ounce of serum. The right cavities of the heart contained dark clotted blood and a large white clot which projected into the veins and pulmonary artery: the left cavities also contained a fibrinous clot, which extended several inches into the aorta: these clots had numerous attachments to the walls of the heart: the valves of the left side were thickened and incomplete. The spleen was enlarged, soft and pulpy; the other abdominal viscera were healthy.—*Hospital, Fort Scott, Kansas.*[*]

The following case, discovered among the records after the others had been placed and numbered, is inserted here as of interest in connection with those just recorded:

Private Philip Kiser, Co. M, 3d Ky. Cav.: age 20: was admitted November 29, 1864, with a gunshot wound of the left leg near the head of the tibia, received at Murfreesboro, Tenn., October 7, 1864. He was put upon light duty at the barracks until January 1, 1865, when he was admitted to hospital, having had a chill which was followed by fever, nausea and vomiting. When first seen, January 2, the vomiting continued. A sinapism was applied over the stomach, and mercury with chalk, morphia and camphor were administered in small doses every two hours. Next day the pulse was small and rapid, 90 per minute; the respiration, normal; temperature, normal; 37 per minute; and the abdomen exceedingly tender, particularly over the cæcum. On the 4th the vomiting persisted and the bowels were tympanitic, the pain and tenderness being much increased. Brandy-toddy or milk-punch was given hourly, and frictions and artificial heat were applied to the feet. On the 5th the symptoms were aggravated: the respiration increased to 40 per minute; the pulse imperceptible at the wrist; the extremities cold and the general surface cyanotic. Death occurred on this day. *Post-mortem* examination eighteen hours after death: The calvaria was not opened. The pericardium contained four ounces of serum; the posterior surface of the left lung was hepatized, and its apex intensely congested but not hepatized; the right lung was healthy; the heart of normal size; firm clots were found in both ventricles, attached to small granules in the auricular walls, and tubular. The liver weighed sixty-two ounces; its left lobe was softened and crumbled easily on pressure; the gall-bladder was distended. The peritoneal cavity contained eight ounces of sanguineo-purulent serum; the omentum was inflamed and the surface of

[*] A similar case is reported by Dr. Joseph Jones: The patient was sallow, anæmic and subject to attacks of chills and fever. He had a severe chill with embarrassment of respiration on the night of January 25, 1869, and was admitted into the Charity Hospital of New Orleans on the following day. There was great dyspnœa and much restlessness, but the respiratory murmur was audible enough. The heart's action was irregular, rapid and tumultuous and its sounds muffled: the arterial circulation was weakened, the pulse being small and intermittent and the surface cold: the venous system was engorged. Death took place suddenly at 1 P. M. of the 28th. The clot, consisting of distinct fibrinous laminæ free from blood corpuscles, was found occupying the columnæ and cordæ of the right side of the heart: it sent a branching prolongation into the pulmonary artery. Dr. Jones [illegible] the formation of heart-clot during life is very common in malarial fever.—*See Clinical Lecture—Heart-clot. New Orleans Med. News*, Vol. XVII, [illegible].

the intestine reddened and coated with lymph. The cardiac end of the stomach was highly congested. The spleen weighed fourteen ounces and was softened. The kidneys were small and healthy.—*Act. Ass't Surg. D. W. Flora, U. S. Army, Hospital, Madison, Ind.*

Cases 97–99, from their rapidly fatal course and the purpuric blotches which characterized them, were regarded as cases of *spotted fever*.

Case 97.—Private Alonzo A. Lumbert, Co. H, 7th Wis. Vols.; age 19; was admitted from Haddington Hospital, Philadelphia, Pa., July 26, 1864, suffering from partial paralysis of the left arm, resulting from a gunshot wound received at the battle of the Wilderness May 6. The ball had entered on the anterior surface of the arm a little below the shoulder-joint and emerged near the spine of the ninth dorsal vertebra. The patient improved under treatment, gradually gaining the use of the arm, until August 11, when he was seized with nausea, headache, weakness and pain in the lower limbs. Next morning he had a chill followed by fever, pain in the bowels and slight diarrhœa; the nausea, headache and debility were increased; the tongue was coated with a white fur. He was treated with two-grain doses of quinine every three hours. There was no improvement on the 13th; in the evening he vomited frequently and complained of great weakness. Next day the vomiting continued; he was restless; his extremities were cold, face and lips bluish, pupils slightly dilated, pulse imperceptible at the wrist, but his mind remained clear. Circular purplish spots, which were not elevated, made their appearance on the face and right arm; they disappeared under strong pressure and returned slowly when the pressure was removed. Brandy was given freely and bottles of hot water applied to the lower extremities. About 11 P. M. convulsive movements of the limbs occurred, with retraction of the head and muscular twitchings of the face. Death took place within half an hour of the convulsive seizure. *Post-mortem* examination four hours after death: Body well developed; rigor mortis marked; slight discolored spots were observed on the face, right arm and lower extremities; there was also some suggillation posteriorly. The vessels of the pia mater were greatly congested and some exudation of lymph marked their course, especially in the vicinity of the longitudinal sinus; the brain was of natural consistency, the puncta vasculosa numerous; there was no exudation at the base of the brain nor effusion into the ventricles; the cerebellum was less congested than the cerebrum; the pons and medulla appeared to be normal. The surface of the spinal cord in the cervical region had a pinkish hue, due to congestion of the pia mater; its substance was natural in consistence and color. The lungs were engorged with blackish fluid blood, which exuded on section. The heart was rather small and was filled with black fluid blood, which was frothy in the right but not in the left cavities. The liver was of natural size, but darker than usual in color and engorged with fluid blood. The spleen was rather large and congested and its parenchyma firm. The mucous membrane of the stomach presented a number of ecchymosed spots; portions of the small intestine were much congested and the solitary follicles and glands of Peyer were enlarged; the mesenteric glands were engorged with dark blood. The kidneys were likewise engorged with blood.—*Act. Ass't Surg. Charles Carter, U. S. A., Turner's Lane Hospital, Philadelphia, Pa.*

Case 98.—Private Charles Octmier, Co. G, 79th Pa. Vols.; age 45; was admitted May 17, 1865, with diarrhœa of six weeks' duration, two to six stools daily, but with no pain nor fever; his feet were œdematous, which condition was ascribed to hard marching. Delirium of an acute character was developed on the 20th, the patient talking loudly, making frightful grimaces and constantly seeking to leave his bed. Next day at 8 A. M. his pupils were dilated and he was unable to recognize any one; pulse rapid and feeble; tongue dry and parched; stools and urine passed involuntarily; a purple petechial rash appeared over the body, especially on the abdomen. At 9.30 A. M. he slept quietly. Two hours later he was in collapse and gasping for breath; pupils much contracted. He died at 1 P. M. *Post-mortem* examination twenty-three hours after death: There was much emaciation. The lungs were adherent on both sides, congested posteriorly and contained crude tubercle and several chalky concretions; the apex of the right lung contained also a small vomica about the size of the thumb-nail. There were two ounces of yellow transparent serum and two yellow coagula in the pericardium; on the surface of the heart was a serous effusion which appeared around the auricular appendices as a jelly. There were three ounces of a turbid, reddish liquid in the abdominal cavity; the mesenteric glands were softened; the liver was small and soft; the spleen semi-fluid; the kidneys normal; the stomach eroded and ecchymosed; Peyer's patches exhibited the shaven-beard appearance; the rectum was much ulcerated; the bladder distended with urine.—*Douglas Hospital, Washington, D. C.*

Case 99.—Private Louis Gross, Co. H, 9th Invalid Corps; age 42; admitted November 19, 1863. On admission this man had much fever and a hacking cough, with an expectoration of frothy mucus. A cough mixture and solution of acetate of ammonia were ordered. Next day at 7 A. M. he had a hemorrhage from the bowels; at the same time the superficial capillaries of the thighs and abdomen became congested, and the capillaries of the whole surface of the body were soon affected in like manner, assuming in patches the appearance of hemorrhagic extravasation. Whiskey was administered every half hour, but he sank rapidly and died at 10 A. M. *Post-mortem* examination five hours after death: Extravasations of blood over the entire surface of the body. Bright-red spots on the surface of both lungs; extensive pleuritic adhesions over the left side. Right auricle and ventricle of the heart considerably dilated, the auriculo-ventricular opening being large enough to permit the passage of three fingers; the mitral valve thickened and feeling like cartilage. Liver weighing seventy-two ounces; gall-bladder distended; spleen normal. Mucous membrane of stomach, ileum and colon presenting bright-red spots similar to those on the surface of the lungs; the descending colon containing a large quantity of fluid blood; the last twelve inches of the ileum presenting old ulcers, and the lower part of the ileum and the large intestine generally much congested; kidneys healthy.—*Act. Ass't Surg. Lloyd Dorsey, Harewood Hospital, Washington, D. C.*

In connection with these cases the following reports are of interest:

Surgeon R. M. S. JACKSON, 11*th Pa. Vols.; Annapolis, Md., January* 31, 1862.—The cases of unusual interest in this report are those of a disease now popularly called *spotted fever*, and catalogued as *malignant congestive fever*. The following are some of the leading features of the cases, all of which presented great uniformity of nosographic points, there being but few premonitory symptoms. First a severe chill with extreme oppression; violent pains in the head and limbs, the latter complained of as an "awful soreness," or as "stinging" and "burning;" expression of terror and alarm in the countenance, particularly noticeable in the eyes; cold skin; most of the cases pulseless at the wrist when first examined. Spontaneous vomiting occurred in some, and in one case constant inclination to go to stool, with but little or nothing passed from the bowels. Spots appeared in from four to ten hours after the attack, the patients dying generally from ten to twenty hours after the appearance of the spots; one case lingered three days. The shortest time from attack to death, including appearance of spots, was sixteen hours. The spots were of various sizes and shapes, first appearing on the feet and legs; some were of a stellated or radiating form, bright red; others roundish and irregular, of a bluish color, and from a mere point in size to a quarter of an inch in diameter. They gradually extended over the whole trunk, superior extremities and face, at last appearing on the eyelids as small blood blisters. These spots, as death approached and after death, became larger, more diffuse and of a bluish or purple color. In some of the cases there were large blotches of the size of the hand or larger, connected together irregularly over the body and limbs; in some, after death, the face became of a livid color, puffy and swollen, the eyes protruding, lips turgid and flabby, a frothy mucus boiling from the mouth and a sanious substance issuing from the nose and ears. Before death some of the cases had the mottled appearance of persons who had been bitten by venomous reptiles.

The *post-mortem* appearances very soon after death exhibited a dissolved condition of the blood and a putrefactive tendency of the fluids and solids. Cadaveric odors were emitted by some of the bodies almost immediately after death, while the abdomen became enlarged by distending gases and the face presented a bloated appearance, with frothy boilings from the mouth, already described. The brain revealed the marked *post-mortem* appearance of *dissolved* or *dead* blood; its inferior portions showed a gradually increased saturation of the membranes and cerebral substance, the bloodvessels blackening almost the entire surface. The sinuses and large veins being punctured discharged their contents of inky blood in a state of perfect dissolvedness. The hyperæmia from hypostasis was particularly marked, the blood appearing to sink from gravity by percolation like water through the tissues. The membranes of the brain showed no evidence of inflammation, only passing engorgement. The substance of the brain, exposed by slicing it down from the vertex to the base, seemed unaltered in mechanical consistence, but darker of hue in both medullary and cineritious substances. The cut vessels penetrating the cerebral mass exhibited the same condition as those of the periphery. The ventricles were full of a light straw-colored serum, no doubt the effect of a mere mechanical transudation of the watery portion of the blood from relaxed vessels and tissues. It was evident that no inflammation *could* have existed in the brain or its investing membranes, for the mental manifestations were clear in many cases to the last. The cavity of the abdomen showed some effusion; its contents presented the same general tendency to ecchymosis of tissue as existed on the skin and other organs. The stomach exhibited no evidence of inflammation, but the same dark and mottled appearance predominated. The inner surface was of a dark-yellowish muddy color, as if slightly stained by bile, but contained only mucus and undigested material recently swallowed in the shape of beef-tea, brandy, etc. The whole bowel was of a dark mottled color, the large intestine being distended with gas. The liver was normal but of a darker brown color than usual.

The troops of this regiment came from Harrisburg on the Susquehanna river. This is a well-known malarious region, the Juniata and Susquehanna rivers having been long noted for their autumnal fevers. Most of the men enlisted had come from districts of the State where these diseases are unknown and were thus, as is a well ascertained fact, more liable to attacks of miasmatic affections. Before leaving Harrisburg, where the regiment remained from the latter part of August until the 27th November, 1861, the principal diseases were clearly of malarial origin—intermittent and remittent fevers assuming a typhoid form. A number of typhoid cases were left at Harrisburg; many of these died. On our arrival at Annapolis over one hundred men were on the sick-list, nearly all of whom were taken sick at Harrisburg. For one month after our arrival at Annapolis the troops had no vegetables, as they could not be procured. They were crowded into the buildings of St. John's College, where many other regiments had been quartered at different times. These buildings had never been cleansed, renovated or disinfected in any way. The deleterious influence of over-crowding was thus added to the transported poison. Efforts were made to get lime and disinfectants in vain, and as the troops were constantly expected to move from this station no radically reformatory measures with regard to the vicious condition of the post were persevered in. * * * When the troops were supplied with vegetables the scorbutic condition of the blood of many of the men was soon changed and the health of the regiment was speedily improved. [On the monthly report of sick and wounded from this regiment for January, 1862, signed by Surgeon Jackson, are 7 cases and 3 deaths reported under the head of *other fevers*, and on the list of deaths the three deaths are ascribed to *febris maligna congestiva*.]

Surgeon R. M. S. JACKSON, 11*th Pa. Vols.; Annapolis, Md., March* 1, 1862.—The cases of interest in the accompanying report for February, 1862, are of the class of fevers: Congestive 17, intermittent 9, remittent 8. The occurrence of such a number of intermittent and remittent cases with clearly defined features is significant as showing a national *genesis* for the whole class. The cases of congestive fever were clearly the old form of "spotted fever." The symptoms were the same, with a slight modification in some of the characteristic points. Many of the cases exhibited the same style of maculation, the same intensity of quickly locked and gorged congestions of the splanchic cavities, the same disposition to fatal first chill, etc. One striking modification was observed: Some of the cases

without spots on the extremities, but with the same symptoms otherwise, showed a remarkable swelling of the *integuments of the head and face*. This bloated puffy look was the most striking appearance, together with a dingy blueness of the integument in other parts of the body, while the injected condition of the vessels of the conjunctiva produced a regular chemosis or elevated ring around the cornea. Only one of these cases proved fatal.

The improved condition of the general health of the troops, from a proper supply of food or mixture of vegetable matter in their rations, accounts for the increased power of resistance to disease; bloodless and scorbutic constitutions having become more highly vitalized, the surgeon's efforts to arrest the destroying powers have been of more avail. A clear apprehension of the true pathology of the disease having been established, the remedies employed have had marked success.

Surgeon SAMUEL A. SABINE, *9th N.Y. Art'y.; Fort Mansfield, Md., February* 8, 1864.—You will observe in my report for January that there have been taken on the sick report seven cases of congestive intermittent fever, of which four have died. I find that the disease occurs most frequently among the new recruits, and from observation I have ascertained that the locality from which they were taken appears to have a controlling influence. A large number came recently from Onondaga County, N. Y., which abounds in malarial poison exhaled from the numerous swamps in that portion of the State. Four out of the seven cases of congestive fever have occurred among these recruits. The symptoms of this disease are extremely varied, indeed no two cases are the same; yet a similarity exists which enables the careful observer to detect the same *materies morbi* exerting its influence with deadly effect upon the brain and nervous system. In some cases the symptoms are identical with those occurring in the congestive fevers of the West, while in others there is no perceptible chill from first to last. But a better idea of the symptoms may be obtained by reporting a few of the cases:—

1. John Boyer, Ordnance Serg't, 47 years of age; married; in the service seventeen years; always healthy. Was called to see him about 8 P. M. and found him in a profuse sweat, his clothes being completely saturated; pulse 115, small and soft; tongue clean; extremities inclined to be cold; respiration normal; countenance pale and anxious. About 5 o'clock he had eaten a hearty supper, soon after which he went for a pail of water; on returning was attacked with faintness, indescribable sensations and pain in the epigastrium and right side of the chest. Sinapisms were applied to the extremities and stimulants directed to be given at frequent intervals until the pulse grew stronger. I placed him in charge of a competent person and left him. He soon became comfortable; took something to eat and drink during the night; told his wife he felt so well she must go to bed. She did so, and he was perfectly quiet and comfortable until 6 A. M. when, while standing upon the floor, he was again seized with the same feeling as at first and died immediately. -No autopsy.

2. Albertus Cowan; 20 years of age; healthy. He was taken with a chill on the morning of January 14 and continued to get worse until night, when he became insensible and was brought to hospital. He moaned constantly, and when disturbed was violent. The pulse was 64 and intermitted occasionally; it was slow and had but little force; respirations 35 and some catching of breath; no stertor; skin natural in color and but slight coolness of surface; pupils dilated and insensible to light. He could not be aroused nor induced to swallow anything. Directions were given to have his head shaved and blistered. At 6 P. M. some slight improvement was manifest; the pulse was stronger and the respiration improved. The blister had drawn well, and some beef-tea and stimulant had been given during the evening, but the patient remained perfectly unconscious. On January 16 there was a decided improvement. He was semi-conscious, and took beef-tea in sufficient quantities; pulse 70 and regular. Ordered thirty grains of quinine in two powders, four hours apart. On January 17 the improvement continued. It was noticed that there was a slight strabismus of the left eye. The blister was re-applied to the scalp. On the 20th the pupils had resumed their natural size and the strabismus was entirely removed. After this he gradually improved until the present time, but has had symptoms of remitting fever. He convalesces slowly.

3. Garrett S. Prosse, 20 years of age; healthy. He had been in the service but two or three days when he was attacked in the same manner as Cowan. I did not see him until twenty-four hours after the attack, as the men composing the company were all new recruits and their officers were not notified of his illness. He did not become insensible until about eight hours after the chill. His pulse was 60, slow, soft and with but little force; respiration 34 and sighing. A brisk cathartic was given which moved the bowels thoroughly; but his condition did not improve. He died on the third day. No autopsy.

In all the cases that recovered there has been a tendency to remitting or intermitting fever during convalescence, which has invariably been slow.

Surgeon DAVID MERRITT, *55th Pa. Vols.; Beaufort, S. C., May* 10, 1863.—We have also had in the regiment a few cases of congestive, or as it is termed by some writers, pernicious fever. In most of them there has been very little time in which to do anything by way of medication, so rapidly has the disease resulted in death. In these cases the congestion has manifested itself in various ways: In one case spinal congestion was evinced by the prolonged spasms which occurred with hardly any intermission; in other cases spinal irritation or spinal meningitis; in others, congestion of the brain at a very early period, with obliquity of vision, sardonic grin and evidences of a disposition to convulsions; in others, intense congestion of the lungs, which, upon examination after death, were found engorged with dark venous blood; in others, congestion of the bowels, accompanied by extravasation of venous blood from the mucous membrane of the intestine and by softening of the mucous membrane to a remarkable degree. One case, sent to General Hospital No. 3, Beaufort, S. C., Ass't Surg. F. T. DADE, U. S. Vols., in charge, I particularly remember: Private John Moyer, Co. H, 55th Pa. Vols., came to me after surgeon's call and asked for "a dose of physic," as his bowels had not been moved for three days. He did not appear to be sick. I gave him at one dose twenty grains of mercury with chalk and fifteen grains of powdered rhubarb. This was taken at about 8 A. M. At 2 P. M. I was summoned to his tent and found him in a state of syncope, from which he rallied under the adminis-

tration of stimulants. About 3 P.M. he was removed to hospital, and died the same night at about 9 o'clock of intestinal hæmorrhage, a pool of dark venous blood beneath him in the bed. Persulphate of iron had vainly been given by enema, and sulphate of quinia, capsicum, ether, brandy, etc., administered internally. By invitation of Dr. DADE I was present at the *post-mortem* examination twelve hours after death. The brain was slightly congested. The lungs were nearly normal and not noticeably changed. The heart was normal. The liver presented the nutmeg appearance; on section it was found to be considerably congested. The spleen was *very much enlarged, very friable and much congested.* One of the kidneys presented an extravasation of blood on its surface. The stomach was *slightly* congested. The intestines contained a quantity of extravasated blood; Peyer's glands and the solitary follicles were somewhat congested and the mucous coat of the whole intestinal canal was so much softened that it was possible, with the handle of the scalpel, to *scrape off the mucous coat* and leave the *muscular* coat denuded.

Another patient died during the chill, living only about ten minutes after being brought to the regimental hospital on a stretcher from his quarters, where, less than three hours previously, he had been joking with one of the drummer boys. This was Private Edward Riley, of Co. D. Another case, Private Philip Miller, of Co. H, died comatose a few days after admission to regimental hospital, the whole external surface of his body presenting an icteroid hue before death. Another, Private Irwin Little, of Co. I, died soon after admission to regimental hospital, and in this case the surface of the body became jaundiced immediately after death. This man, like the others, was treated with quinine, capsicum, brandy, etc.; calomel was given with a view to stimulating the secretion of the liver, and mustard applied to the surface of the body and limbs.

Surgeon W. M. SMITH, *85th N. Y. Vols.; New Berne, N. C., February* 22, 1863.—Two men died in hospital at Suffolk of remittent fever with meningeal complications. *Post-mortem* examination showed that the arachnoid surface of the falx cerebri was much congested, having *plastic exudation* at several places on its surface. In one case the right lateral ventricle contained one ounce of turbid serum tinged with blood; the left ventricle contained six drachms of serum less turbid than bloody. The arachnoid surface of the tentorium cerebelli and the visceral layer of the arachnoid covering the cerebellum were greatly congested.

Surgeon W. H. GRIMES, *13th Kansas Vols.; near Springfield, Mo., February* 2, 1863.—Many of the men were taken with high grades of bilious fever and several died of congestion of the brain. In these cases the most active treatment was pursued: the patients were bled, cupped, blistered; had calomel and the bitartrate of potash and antimony, and other remedies as the indications demanded; yet we were unsuccessful. We began to doubt our powers of diagnosis, but the citizens told us that congestion of the brain is a common disease in this region, and that their doctors bleed and give large doses of calomel.

Ass't Surg. J. W. MASON, *12th Corps d'Afrique; Port Hudson, La., February* 23, 1864.—Nearly all the cases that came under my observation in the months of October and November, 1863, were the result of zymotic influences; these, coöperating with the scorbutic taint that had been largely developed in the regiment, produced, in even the ordinary incidental diseases, an adynamic condition of the system. Many laboring under this pathological condition were attacked with typho-malarial or congestive fever. The typho-malarial cases were in most instances amenable to treatment, but a large proportion of the congestive cases proved fatal. The most prominent point of interest developed in this unmanageable disease was a loss of vital force. As an unusual thing the disease was ushered in with a slight chill, but generally this was not apparent. In some cases the patients would soon become cold and pulseless; and no treatment, however vigorous, succeeded in establishing reaction. Death closed the scene in a few hours, or the patients lived for several days conscious and without pain, and then died quietly, as though they had fallen into a gentle slumber.

Lastly, two cases of chronic malarial poisoning are given, with some references from New Berne, N. C., to this condition among the troops operating there in 1863. In both cases the blood was evidently greatly altered. In one, the spleen weighed sixty-eight ounces and the veins contained soft greenish-white clots, while in the other there was diffluent blood in the pleural cavity and the liver and spleen were disorganized.

CASE 100.—Private Levi Beech, Co. D, 1st Mich. Cav.; age 36; was admitted October 27, 1864, with a contusion of the left side caused by the kick of a horse. He was feeble; the spleen was much enlarged, occupying nearly the whole of the left lumbar region and parts of the umbilical and left inguinal region. He had suffered from ague eight years before for fourteen months, the disease intermitting occasionally for about a week at a time. After admission his appetite was variable, and he lost flesh although his bowels were regular. He was treated with citrate of iron and quinia, stimulants and nourishing diet. He was able to be about the ward and out of doors; occasionally he had some cough. About noon on December 31 he became speechless and unable to swallow. He died at 6 P. M. *Post-mortem* examination: No rigor mortis. The brain was normal; its membranes somewhat adherent to the medulla and pons. The right cavities of the heart were distended and a greenish-white, soft, almost pus-like clot floated in the ventricle. The right lung was somewhat congested and adhered by old firm fibrinous bands; the left lung was congested by hypostasis; one or two glands at the root of the left lung contained cheesy and chalky matters. The liver was large and bloodless; its portal veins filled with soft yellow clots. The spleen weighed sixty-eight ounces and adhered to the diaphragm and stomach; its veins contained soft greenish clots; a secondary spleen the size of an unhusked walnut was found at the head of the pancreas. The mesenteric glands were indurated and about the size of a pea. The ileum and colon were normal. The psoæ muscles were softened and their surfaces blackened. The external iliac arteries contained blood. The kidneys were white and fatty. Microscopically the

greenish-white clots of the heart and bloodvessels consisted of granules and polynucleated cells, many of the latter a little larger than a blood corpuscle, but the majority much larger.—*Third Division Hospital, Alexandria, Va.*

Case 101.—Corporal S. Cininion, Co. K, 44th N. C.; died June 13, 1863. The patient had been sick for some time and died suddenly and unexpectedly. *Post-mortem* examination: The right lung was adherent to the costal pleura. The heart was very soft but contained no clot. The thoracic cavities on either side contained three ounces of uncoagulable blood, the red corpuscles of which, under the microscope, were seen to be broken down, stellated and withered, the serum of a yellowish-red color and the white corpuscles very numerous, seemingly from the absence of the red. The liver and spleen were pultaceous and disorganized. The kidneys were flabby.—*Ass't Surg. H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Surgeon F. J. D'Avignon, *96th N. Y. Vols.; New Berne, N. C., February* 28, 1863.—The low diet, constant exposure, want of rest and severe labor from which the regiment suffered during the summer of 1862, while before Richmond and at Harrison's Landing, so reduced the vitality of the men that the influence of the miasmatic atmosphere of the swamps, the intense heat and the impure water used, met but feeble resistance. It was a common thing for healthy robust men to lose thirty, forty and even fifty pounds of flesh in a few days; and the sunken eyes, emaciated form and languid step demonstrated the existence of agencies beyond the influence of medicine. The ordinary remedies for disease seemed of no avail.

Surgeon Isaac F. Galloupe, *17th Mass. Vols.; New Berne, N. C., February* 20, 1863.—In the latter part of June, 1862, intermittent fever and other malarial diseases began to appear in this command, increasing in severity and prevailing more extensively as the season advanced, until November, when the regiment was quartered in town. Notwithstanding the extreme prevalence and severity of miasmatic diseases but few deaths occurred. During the months of August and September several hundred cases were reported, but of these only five proved fatal. In many cases, however, paralysis agitans, chorea and ascites resulted. In other cases the constitution was completely broken down and the men were discharged the service. No treatment was of any avail except by quinine, and this was most effectual. When cinchonism was rapidly produced the disease was promptly and almost invariably broken up. It was rare that a patient would have a second paroxysm after coming under treatment.

Besides the relatively small number of cases presented above, it is recorded in thirty-eight of the cases embraced in the chapter on the alvine fluxes that the patients were suffering or had recently suffered from intermittent fever;* and references to remittent fever occur with equal frequency. In view, however, of the enlarged spleens and other more or less characteristic conditions found at the *post-mortem* examination of the diarrhœal cases, it is probable that a much larger number of them than is shown by the clinical notes were concurrently affected by the malarial influence.

II.—Pathological Anatomy and Pathology of Malarial Disease.—In summarizing the pathological appearances presented by the recorded cases of malarial disease, it seems proper to exclude the nine cases, 83–91, in which typhoid fever is suggested by the clinical history or morbid anatomy. There remain FORTY cases of death from malarial affections in which *post-mortem* investigations were held.

The Stomach.—In ***twenty-one*** of the cases the condition of the stomach is not stated; it was normal in ***five*** and constricted in ***one***. In ***thirteen*** cases a morbid condition is specified thus: In *four* the organ contained a green grumous or mud-like liquid; in *two* its mucous membrane was congested; in *one* softened; in *one* slate-colored; in *one* thickened, and in *four* ecchymosed.

The Intestinal Canal.—In ***six*** of the forty cases the intestines were reported healthy; in ***nine*** their condition was not stated. In ***thirteen*** of the remaining twenty-five cases the large and small intestines, so far as can be ascertained from the phraseology of the reports, were both affected.† *Five* of these cases, 59, 64, 65, 73 and 93, were much congested or inflamed, but not ulcerated; in the first-mentioned, for instance, the canal was almost black from the engorged condition of the capillaries, and coagulated blood was found in its interior. In *one* of the thirteen cases, 81, the mucous membrane was softened and in *seven* ulcerated; in two of the latter, 70 and 80, the duodenum alone was ulcerated, although the canal generally was highly congested; in 67 the ulcerations were reported as slight; in 77 as old; in 71 and 72 as large and small, and in 75 as associated with a congested condition of the mucous membrane. In ***six*** of the twenty-five cases the condition of the small and the large intestine is specifically stated: In 74 both were inflamed, but the patches of Peyer were not diseased; in 99 both were much congested and ecchymosed; in 57 and 94 deposits of black pigment were found in the large intestine, while the ileum in the former was but slightly congested and in the latter merely stained with bile: on the other hand the patches of Peyer in 98 presented

* See, in the Second Part of this work, cases 95, 103, 104, 171, 189, 191, 194, 196, 243, 260, 272, 305, 316, 373, 389, 396, 401, 410, 433, 517, 532, 601, 614, 639, 686, 704, 735, 738, 742, 747, 758, 776, 809, 852, 854, 857, 858, 859.

† In Algeria, where the French troops were exposed to influences similar to those affecting our soldiers in the malarious districts of the South, the lesions of chronic dysentery were, according to Laveran, constantly found in cases of fever when death occurred a long time after the commencement of the malarial affection.—*Recueil de Mémoires de Médecine de Chirurgie et de Pharmacie Militaires*, 1 série, t. LII, 1842, p. 83.

the pigmented appearance, while the rectum was ulcerated; in 68 the mucous membrane of the ileum was softened and thickened, that of the colon congested. In the remaining six of the twenty-five cases the small intestine or large intestine was affected: In 55, 66 and 97 it was congested, and in the last-mentioned case the patches of Peyer and the solitary glands were enlarged; in 82 it was ulcerated; in 69 congested to a purple color, which presented a deeper tint in the areas of the solitary glands, although the patches of Peyer were unaffected; in 56 also there was a deeply colored congestion, which was specially marked throughout the jejunum.

In two of the cases, 79 and 70, in which the condition of the mucous lining is not stated, there was peritonitis, and in two, 78 and 80, in which the mucous lining was congested, there was, in addition to peritoneal inflammation, a slight ulceration of the duodenum and in the other ulceration of the duodenum and pancreas. Some serous effusion was found in the peritoneum in two other cases, and in several there was more or less injection and darkening of the serous membrane.

It would appear from these records that although inflammatory tendencies in the intestinal canal were not an invariable consequence of malarial disease, they occurred with more frequency than might reasonably be referred to the concomitant action of diarrhœal causes not distinct from the malarial poison; and further, that the incidence of the disease was not localized on any particular part of the tract, but affected alike the large and the small intestines of the gut. The slight preponderance of cases in which the small intestine was affected may be referred to diarrhœal causes as in Maillot's cases, given below,* the preponderance seems to have been due to the inclusion of typhoid fever.

In this absence of partiality for a particular region of the intestine as the site of its manifestations, the malarial poison differs essentially from the typhoid. The lower part of the ileum, as will be seen hereafter, was the site of typhoid developments when no other part of the canal was affected, and when a greater extent of the canal was involved this part of the intestine more extensively affected than others. But in the cases at present under consideration the duodenum, jejunum and colon were found, one or all, to be at times implicated without a corresponding intensity of the inflammatory action in the ileum.

Another and striking difference will be observed between the action of the malarial poison and that of the typhoid disease on the intestines. In the latter the inflammatory action was circumscribed and its force expended on the closed glands of the mucous tract, which were destroyed by ulceration or sloughing, while the general surface was not necessarily involved. In the former, on the contrary, the action was general over the parts of the intestine implicated and not confined to a particular anatomical component; and if the closed glands were affected they were not specially so, but only as forming a part of the congested tract. Moreover, while in the typhoid cases the mucous lining of the intestine between the glands was sometimes darkened or reddened with congestion, the engorgement was rarely so diffuse or intense as in the malarial cases in which the intensity of the congestion was often manifested, as in 97–99, by ecchymoses, or as in 59, by the escape of blood into the canal from its engorged and thickened membrane.

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* The following statistics of Maillot's observations are given for comparison with the text.—See *Traité des Fièvres Intermittentes*, Paris, 1836, p. [illegible]. Among the observations that I have collected and reported there are twenty-eight cases of *post-mortem* inquiry. In all these the digestive organs were examined, but in a single case the head was not opened, and in another case the chest; in twenty-one cases the condition of the spinal cord is [illegible]. The small intestine presented its [illegible] appearance in [illegible] cases; the [illegible] appearance of the mucous membrane of the small intestine in [illegible] cases, only once was it in a normal state. The alterations were: Gray slate-colored softening, without vermilion-colored injection, in a case of quotidian fever which became typhoid; dirty-gray softening, with punctated vermilion injection, in a case of quotidian fever which became typhoid; dirty-gray softening, with extensive vermilion injection; dirty-gray softening, without vermilion injection, in a case in which death did not occur until after twenty-three days' illness; [illegible] softening, without injection, occurs in a case of rupture of the intestine in malarial cachexia; [illegible] softening, without injection, occurs in a case of typhoid fever; [illegible] was found in one case of typhoid fever; [illegible] in a case of typhoid fever; [illegible] in a case of typhoid fever. [illegible] in a case of typhoid fever. [illegible] in a case of typhoid fever.

The condition of the LIVER was not stated in ***four*** of the cases; in ***eight*** it was reported normal. Enlargement is mentioned in ***sixteen*** cases, of which *one* was reported in addition to be pale and with soft yellow clots in its vessels, *one* congested, *one* soft, *one* tubercular, *one* bluish, *one* slate-colored and *one* as presenting nutmeg foliations. In ***one*** the liver was congested, in ***one*** congested and softened and in ***two*** softened; in ***one*** it presented the nutmeg appearance; in ***one*** it was fatty, in ***one*** pale and soft, in ***one*** fawn-colored, in ***one*** partly blackened, in ***one*** bronzed, in ***one*** dark-colored and engorged with fluid blood and in ***one*** pultaceous. In one case the gall-bladder was found to be ulcerated.

Dr. STEWARDSON,* after a series of necropsies in cases of remittent fever, came to the conclusion that a change in the color of the liver from a reddish-brown to a mixture of gray and olive was the anatomical characteristic of the disease in the series which he had studied, and probably also in all cases, as this series was made up of cases extending over three successive seasons, and originating not in a single locality but in different and widely separated places. The organ was described in individual cases as of the color of bronze, of a mixture of bronze and olive or of a dull lead-color externally and bronzed with a reddish shade internally. *Post-mortem* records antedating STEWARDSON's observations, made occasional mention of an engorged and dark-colored liver in cases of malarial fever; and in 1847 MECKEL† referred the coloration to pigment in the blood, where it was found later by other investigators.

FRERICHS,‡ in 1854, during an epidemic of fever in Silesia, resulting from an overflow of the Oder, observed deposits of pigment in the liver and spleen, and frequently in the brain and kidneys. The liver was steel-gray, blackish or chocolate-colored, sometimes presenting brown insulated figures on a dark ground. The pigment to which this coloration was due consisted of granules, larger masses and true pigment-cells in the capillary networks of the portal and hepatic veins, and in many cases in the arteries. It was noticed also that while there was enlargement from congestion in acute cases, the organ was frequently diminished in size.§ Some years later Dr. J. FORSYTH MEIGS‖ made a series of observations in the wards of the Pennsylvania Hospital which he presented as attesting the accuracy of FRERICHS' views.

The *post-mortem* notes given above show such variety in the color of the organ that it is impossible to consider the bronzed or gray and olive liver as a constant pathognomonic lesion. MAILLOT¶ and E. COLLIN** show similar autopsical results; and DUTROULAU, while regarding congestion, with augmentation of volume and consistence, as the prominent condition, refers also to fatty degeneration and changes in color from altered secretions, and especially from the presence of pigment formed in the liver itself or derived from the spleen.††

The SPLEEN‡‡ was normal in ***seven*** cases, while in ***eight*** its condition was not reported. There was

* *See Observations on Remittent Fever founded upon cases observed in the Pennsylvania Hospital. Am. Jour. Med. Sciences*, Vol. I, N. S., 1841, p. 289.

† H. MECKEL—*Ueber schwarzes Pigment in der Milz und dem Blute einer Geisteskranken. Allg. Zeitschr. für Psychiatrie*, Bd. IV, 1847, S. 198—first observed black pigment-cells in the blood of an insane patient who died of phthisis: it is not known whether he had intermittent fever. The spleen, liver and brain were rich in pigment. VIRCHOW—*Zur path. Physiologie des Bluts. Archiv*, Bd. II, 1849, S. 587—observed pigment-cells in the blood of the heart of a man dead of malarial cachexia.

‡ *A Clinical Treatise on Diseases of the Liver.* New Sydenham Soc., London, 1860, Vol. I, p. 317.

§ "In all the cases which terminated fatally (38) the liver contained a quantity of pigment; in ten it appeared enlarged and congested and in eight atrophied; in nine cases the cells contained much oil; lardaceous matter could be detected in three cases, but only in small quantity. Except in one case, pigment was always found in the spleen; three times this organ was lardaceous, and in thirty cases its volume exceeded the usual limit." *Op. cit.*, p. 334.

‖ *On the Pathological Appearances presented in Marsh Fever. Am. Jour. Med. Sci.*, Vol. L, N. S., 1865, p. 305.

¶ Thus MAILLOT: In five instances the condition of the *liver* was not indicated; in five it presented nothing abnormal; nine times it was congested; three times friable; once brittle; three times yellowish, pale and soft; once greenish-yellow, and once it had the aspect of a cake of chocolate.

** In COLLIN'S 52 cases of pernicious fever the liver was normal in size in six cases and hypertrophied in forty-six; in ten of the latter it was softened and in two indurated. The color was altered in nineteen cases to such tints as dark-brown, chocolate, bistre, fawn-color and earth-color; but he notes his failure to observe the morbid coloration mentioned by STEWARDSON in his Pennsylvania Hospital cases.—*Recueil de Mémoires de Médecine de Chirurgie et de Pharmacie Militaires*, 2e série, t. IV, 1848, p. 128.

†† DUTROULAU.—*Traité des Maladies des Européens dans les pays chauds.* Paris, 1864, p. 196.

‡‡ MAILLOT speaks of the spleen thus: In five cases its condition was not indicated; in one only it appeared normal; twenty one times it was larger than usual, in one instance without change of color or texture; thirteen times it was of the color of the dregs of wine; seven times chocolate-colored; in one case it was broken and reduced to a wine-colored pulp, and in one in which it resembled a cake of chocolate, its fibrous membrane was easily detached and crackled like a sheet of parchment.

enlargement in ***nineteen*** cases, accompanied in *twelve* with softening or pulpiness,* in *two* with congestion, in *one* with abscess† and in *one* with infiltration of pus. ***One*** spleen was congested and softened, ***one*** congested and dark-colored, ***one*** soft and small, ***one*** semifluid, ***one*** pultaceous and ***one*** firm and of a dark mahogany color.

The connection between enlargement of the spleen and periodic fevers has been recognized from the earliest times, but as late as 1828 M. GENDRIN noted the fact that medical authorities may be searched in vain for a thorough description of the changes in the spleen in subjects dead of intermittent fever. He endeavored to determine the anatomical characters of these changes by massing and comparing the isolated facts recorded in special papers and works on pathological anatomy. His results showed that the spleen was either tumefied, with or without induration, or softened, with or without tumefaction.‡ M. NEPPLE§ in 1841, arrived at similar conclusions from a study of cases, but he added also that the stagnation of the blood in the spleen tended to hypertrophy, acute and chronic inflammations, softening and degeneration of tissue, which were often fatal. More recently DUTROULAU‖ summarized the alterations in the spleen as simple congestion causing augmentation of volume, hypertrophy of tissue from repeated congestions, and changes in the contained blood involving diffluence and accumulation of pigment, with disorganization of the splenic tissue when the blood has attained an extreme degree of dyscrasia. The cases presented by our medical officers during the war illustrate the various splenic conditions from the normal to disorganization without, and occasionally with, the intervention of inflammatory action, but no mention is made of pigmentary deposits in the organ,¶ as the microscope was seldom used in their *post-mortem* investigations.

Medical writers generally consider the changes in the spleen as the most frequent and characteristic of those occurring in malarial fevers. In all of LAVERAN's cases the spleen was enlarged and more or less softened.** In but one of MAILLOT's cases was it normal. Nevertheless in the cases presented by our medical records there are seven instances of normal spleen in thirty-two cases in which its condition was reported. PUGNET†† found it healthy in six of twenty-seven cases of intermittent fever. HASPEL‡‡ also observed it

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* ROKITANSKI in his *Pathological Anatomy*, B. III, S. 381, says that in obstruction of the circulation the blood, accumulated and retained in the spleen, creates a condition of hyperæmic turgescence of [illegible] tissues as well as of the pulpy substance. This turgescence is always [illegible] tissue following such turgescence may be very different [illegible] as an induration and sometimes as a softening.

† COLLIN—*Recueil des Mémoires de Méd. Militaires*, 2e série, 1855, t. XV—*Ruptures de la Rate*—considers that external violence often acts as the determining cause in the production of suppurative inflammation. BLANC also, in his *Abcès de la rate dans la cachexie paludéenne*, Paris, 1879, agrees with COLLIN, as enlarged spleens are so common and abscess so rare in malarious subjects, and especially since the points where abscess is determined are those most exposed to violence from without or from the traction caused by the weight of the enlarged organ. These points are the superior extremity, the external face and the anterior margin; but the organ may be converted into a capsule filled with pus, in which case it is impossible to determine the point of initiation.

‡ The following is a rendition of M. GENDRIN'S conclusions: 1. The spleen is frequently affected in intermittent fever, and this affection has for its principal character [illegible] an augmentation of volume. 2. The augmentation of volume is always somewhat large and frequently considerable. 3. The tumefaction is sometimes carried so far as to incommode mechanically the functions of the digestive organs. 4. The augmentation of volume extends in all directions, but particularly in length. 5. The tissue of the tumefied spleen is augmented in density, but there is no alteration in its texture; its vessels remain permeable. 6. The [illegible] spleen [illegible] is the immediate effect of certain intense periodical fevers or the result and termination of some old splenic engorgement. 8. The softening is of two kinds: 1st. Idiopathic or not seemingly dependent upon [illegible] 9. There seems to exist a direct relation between certain lesions of the spleen and certain alterations of the blood. 10. The engorged and softened spleen in fevers may be ruptured by causes directed against it and operating against its tissue mechanically or through augmentation of the congestion of which it is the seat. 11. The rupture may be spontaneous from the simple progress of the malady. 12. The [illegible] intermittent fever is a frequent cause of fatal gastro-intestinal hæmorrhage. 13. When this accident occurs the spleen is softened and engorged with blood more or less black, as if it were ruptured; the gastro-splenic veins are dilated, varicose and sometimes ruptured. 14. The spleen is directly and immediately ruptured by hæmorrhage into the [illegible] it may destroy the morbid condition of the spleen.—*Journal Général de Méd.*, Paris, 1828, t. C, p. 385.

§ *Journal de Médecine de Lyon*, t. I, 1841, p. 367. ‖ *Op. cit.*, p. 195.

¶ FRERICHS describes the spleen as bluish black or dark-brown in color, either uniform or speckled, from deposited pigment. *Op. cit.*, p. 318.

** LAVERAN, *Documents nouveaux sur [illegible]*, *Archives de Méd.*, 1878, t. [illegible]

†† *Gazette Médicale de Paris*, 1870, p. 198.

‡‡ HASPEL—*Maladies de l'Algérie*, Paris, 1868, t. II, p. 105.

occasionally in its normal condition, especially when the fatal fever had not been of long duration. Indeed, he considers the absence of splenic lesions in pernicious fevers as frequent and remarkable, referring to BAILLY and JACQUOT for illustrations. DUTROULAU believes the spleen to be normal in 20 per cent. of the endemic fevers of hot climates.

The KIDNEYS were normal in ***nine*** cases recorded by our medical officers, and not mentioned in ***sixteen.*** They were large in ***two*** cases; large and white in ***one;*** congested in ***five;*** fatty in ***three;*** flabby in ***one:*** pale in ***one;*** in ***one*** case they contained cysts and in ***another*** pus.*

The condition of the HEART was not stated in ***twenty-one*** of the cases; it was recorded as normal in ***ten*** cases, leaving only ***nine*** for special mention—thus: Hypertrophy in *one* case, dilatation in *one*, enlargement and fatty degeneration in *one*, flaccidity in *one*, softness in *one* and valvular lesions in *four* cases. Whitish fibrinous clots were noted in the cardiac cavities in six instances, chiefly on the right side; in one case greenish clots were found on the right side, in another loosely formed black clots on both sides, and in another black fluid blood, which was frothy in the right but not in the left cavities. The PERICARDIUM was partially adherent to the heart in one case, and in twelve cases there was an effusion of from one to four ounces of serum, which was tinged with blood in two cases and in one instance contained yellow coagula.

According to the French observers† changes in the muscular tissue of the cardiac walls are frequently noted. DUTROULAU, indeed, regards the alterations in the heart as second in importance only to those in the spleen. M. VALLIN‡ conceives the alteration to consist of a primary transformation of the internbrillar protoplasm into albuminous granules which cloud the striæ, cause swelling and end in fatty degeneration.

The LUNGS§ in the recorded cases were normal in ***nine,*** tubercular in ***three,*** more or less congested in ***ten,*** inflamed in ***seven*** and ecchymosed in ***one;*** in ***ten*** their condition was not mentioned. There were adhesions in four of the cases in which the state of the lung-tissue was not recorded, and a small pleuritic effusion in one in which the lungs were normal. The pleura was adherent also in three cases in which the lungs were congested and in four in which they were inflamed, and there was effusion in two of the pneumonitic and one of the tubercular cases.

The BRAIN in ***twenty-eight*** of the forty cases was probably not examined by our medical officers, as no mention is made of its condition. An examination in ***twelve*** instances showed a normal condition in *five.* In *one* case there was venous congestion; in *three* cases the brain was engorged with blood and presented effusion under the membranes or in the ventricles; in one of these the serum was jaundiced, the blood black and the cerebral tissue firm, and in another the brain-substance was of a darker ash-color than usual. In *three* cases there were indications of inflammatory action, in one injection of the meningeal vessels with some exudation near the longitudinal sinus, in another a similar injection with opacity of the arachnoid, and in the third case thickening of the membranes, effusion and circumscribed softening of the cerebral tissue.

MAILLOT found the brain affected so frequently‖ that he regarded malarial fevers as

* DUTROULAU says of these organs, that when blood and albumen have been observed in the urine with some persistence the *post-mortem* examination shows either pigmentation of the cortical substance or a lardaceous degeneration with an accumulation of pigment. *Op. cit.*, p. 197.

† Thus MAILLOT: The *heart* in six cases was flabby and pale; once flabby with yellowish coloration; once flabby with dilatation of the left ventricle, and four times the walls of this ventricle were hypertrophied. LAVERAN—The heart was of diminished consistence in nine of fourteen cases. *Op. cit.*, p. 84. COLLIN'S experience also shows the heart as frequently affected. In his fifty-two cases of pernicious fever it was normal in two-fifths; its volume was augmented in three-tenths, and in one-half it was flaccid and of a dull livid color. These characters were even more prominent in the chronic cases: In sixty-one cases the physiological condition was noted only in one-fourth, flaccidity with a dull or onion-peel color in two-thirds and augmented volume in four-ninths. *Op. cit.*, p. 139.

‡ M. E. VALLIN, *Des altérations Histologiques du cœur et des Muscles Volontaires dans les fièvres pernicieuses et remittentes. Recueil de Mémoires de Méd. Militaires,* 3me sér., t. XXX. Paris, 1874. p. 12 *et seq.*

§ MAILLOT continues: In one case the chest was not opened; in one, also, it offered nothing abnormal. Thirteen times the pleura presented old adhesions, but the lungs were sound; in one case there was hepatization of the apex of the right lung, and in another some spoonfuls of russet-colored serum in the left cavity. LAVERAN says that in his cases the lungs were always engorged and the bronchial tubes oftentimes filled with blood-tinged mucus. *Op. cit.*, p. 85. In COLLIN'S fifty-two pernicious cases the lungs were normal in only two instances; they were deeply congested in the majority and splenified in one-fifth of the subjects. *Op. cit.*, p. 135.

‖ MAILLOT'S summary is as follows: *Membranes of the brain.*—Five times the arachnoid was generally opaque (once this general opacity coincided with the development of Pacchioni's glands; once, with the same alteration, there were adhesions to the dura mater and a gelatinous subarachnoid infiltration); three times the opacity was confined to the sulci between certain convolutions; in one case of algid icteric fever the arachnoid had a yellowish tint; in one case of quotidian fever which had become typhoid there was a collection of purulent serum in the cavity of the arachnoid. In eleven cases the pia mater was more or less vividly injected, the arachnoid not being so; in six other cases these membranes were simultaneously the seat of a vermilion-colored injection; in the majority of the cases the superficial vessels of the encephalon were markedly congested; several times the injection of the different membranes was sufficiently fine to form more or less extensive patches of an intense and brilliant red. *Brain.*—Twenty-two times the brain was more or less injected; generally of a density and firmness which seemed much more pronounced than natural. Ordinarily it showed a closely punctated red coloration; in some cases of comatose and delirious fevers the cerebral mass was so intensely congested that on compressing it the blood issued from its cut surface as if from a saturated cloth. Eight times we noted a dark coloration of the gray matter, which in five cases was even blackish; six times the choroid plexus was of a dark red color; ten times the ventricles contained a sanguinolent serum. In a comatose fever the brain was soft, although much injected; in a case of algid icteric fever it was slightly injected, of ordinary consistence and yellowish in color; in three other cases it was also slightly injected, but without change of color or consistence. The nervous substance of the cerebellum presented less frequently than its membranes alterations analogous to those in the brain and its membranes. *Membranes of the spinal cord.*—Fourteen times the spinal pia mater was the seat of a vermilion injection; five times the arachnoid and the pia mater were simultaneously injected; in a case of algid icteric fever both had a yellowish color; in another

due to an irritation having for its anatomical character a hyperæmia of the nervous matter and its membranes. The dark coloration of the brain-substance was observed by him and others, especially by BRIGHT,* who illustrated the condition, long before FRERICHS drew attention to it and connected it with other pigmentations in malarial cases. More recently HAMMOND has suggested the possibility of recognizing this condition during life.†

In one of the forty recorded cases the PAROTID GLANDS were inflamed, and in one the PSOÆ MUSCLES were blackened and disorganized.‡

The GENERAL MASS OF THE BLOOD is specially mentioned in two cases as having undergone change; in one it was diffluent and in the other watery and degenerated. In a third case blood, which had escaped into the pleural cavities, was uncoagulable, its red corpuscles broken down, stellated and withered, its white corpuscles relatively numerous and its serum of a reddish-yellow color. But an altered condition of the blood is suggested by the records of many other cases: as by the occasional blood-tinge shown by the effusion into the pericardium; the loose black clots in the heart; the black blood with which the cerebral veins and occasionally those of other organs were loaded, the vessels in one instance having presented yellow specks between tracts of black fluid blood; the soft, greenish, pus-like coagulation which had taken place in the heart and portal veins of one subject, the fibrinous heart-clots of several cases, and the frequent softening and occasional degeneration of the liver and spleen, apparently unconnected with inflammatory processes. Unfortunately the microscope was seldom used, and the records therefore give but little information as to the details of this altered condition.§

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their condition was not stated. *Medullary substance.*—In four cases the cord was generally injected and more than ordinarily firm; in one case it was less firm than natural; in one the injection was very slight; three times it presented a normal consistency without injection; in two cases the injection was general, but much more marked in the cervical and lumbar regions; in one it was of a yellowish tint without other change; in four there was general injection with red dorsal softening: in three the softening, dorsal also, was white: in another the white softening had its seat in the cervical region; finally, in one case the injection of the gray matter, generally more pronounced than that of the white matter, was very intense in the cervical arch, and extended to the red softening in the dorsal portion.

* BRIGHT—*Reports of Medical Cases*, London, 1831, Case CI. Vol. II, p. 217. Plates XVII and XIX. The cortical substance of the brain was almost of the color of black lead, and the minute circulation of the cineritious substance was so loaded with venous blood as to give one general purple-gray color. The medullary matter was of a uniform dead gray-white color, which appeared to be given by innumerable fine gray specks and short hair-like vessels resembling the appearance produced by scraping the nap of fine cloth upon a sheet of paper.

† In an article on *Pigmentary Deposits in the Brain resulting from Malarial Poisoning*, in the *Trans. Amer. Neurological Association*, 1875, Dr. W. A. HAMMOND pointed out that in affections of the nervous system having a malarial origin, and in which presumably there are cerebral pigmentary deposits, similar formations may often be detected in the retina by ophthalmoscopic examination. See also a contribution to the study of the nature and consequences of malarial poisoning.—*St. Louis Clinical Record*, Vol. IV, 1877, p. 129.

‡ M. VALLIN discovered cloudy swelling, obscuration of striæ and fatty degeneration in the fibres of the recti muscles, especially towards their lower part. See article already referred to in connection with changes in the muscular tissues of the heart.

§ The altered condition of the blood was studied by BECQUEREL and RODIER—*Recherches relatives à la composition du Sang, dans l'état de santé et dans l'état de maladie. Compt. rend.*, Paris, 1844, XIX, p. 1083; and by LÉONARD and FOLEY in 1845—*Recueil de Mém. de Méd., &c., Militaires*, t. LX. The latter reporters made analyses of the blood in sixty-six cases of Algerine fever. Their results show, p. 191, a watery condition due to diminution of globules, albumen and inorganic constituents of the serum, without augmentation of fibrin, unless, as in rare cases, the congestion of the organs had developed into inflammation. Dr. JOSEPH JONES gives the following as the results of his investigation into the character of the changes in the blood: "1. In malarial fever the specific gravity of the blood and serum is diminished. The specific gravity of the blood ranges in this disease from 1030.5 to 1042.4, and the specific gravity of the serum from 1018 to 1023.6. In health, on the other hand, the specific gravity of the blood varies from 1055 to 1063, and the specific gravity of the serum from 1027 to 1032. 2. In malarial fever the colored blood-corpuscles are greatly diminished. In health the dried corpuscles may vary from 120 to 150 parts in the 1,000 of blood, and the moist blood-corpuscles from 480 to 600. In malarial fever, on the other hand, the dried colored corpuscles range from 51.98 parts to 107.81, and the moist blood-corpuscles from 207.92 to 323.63. The careful comparison of these analyses of malarial blood with each other reveals the fact that the extent and rapidity of the diminution of the colored corpuscles corresponds to the severity and duration of the disease; a short but violent attack of congestive or of remittent fever, in its severer forms, will accomplish as great a diminution of the colored blood-corpuscles as a long attack of intermittent fever, or the prolonged action of the malarial poison. 3. In malarial fever the relation between the colored corpuscles and liquor sanguinis is deranged. Thus in healthy blood the relative proportions of moist blood-corpuscles in the 1,000 parts and liquor sanguinis may vary from 480.00 to 600.00 of the former, and from 520.00 to 400.00 of the latter; whilst in malarial fever the globules vary from 207.92 to 323.63, and the liquor sanguinis from 792.08 to 676.37. 4. The fibrin of the blood is diminished to a marked extent in some cases of malarial fever, and is altered in its properties and in its relations to the other elements of the blood and to the bloodvessels. 5. The organic matters of the liquor sanguinis, and especially the albumen, is diminished in malarial fever. Thus the solid matters of the serum may vary in health from 90 to 105; whilst in malarial fever they vary from 62.78 to 80.22 parts in the 1,000 parts of blood."—*Medical and Surgical Memoirs*, New Orleans, 1876, Vol. I, p. 586. Dr. JONES makes no mention of pigment in the blood although aware of FRERICHS' views, which he discusses in connection with the autopsies of his cases of chronic malarial poisoning, in both of which the liver and spleen, and in one the brain, were densely loaded with black pigment. American pathologists do not appear to have prosecuted the study of the blood-changes. HUTCHINSON, in an article on a case of enlarged spleen, with remarks on the malarial cachexia, in the *Med. News and Abstract*, Vol. XXXVIII, 1880, p. 449, reports a microscopical examination of the blood as follows: "The red corpuscles are irregular in shape and size and form themselves poorly into rouleaux. Most of them show a tendency to alter in shape—to become double-convex. The white corpuscles also vary in size and are slightly increased in number, a few more of them being seen in a field than in health, but the blood is not leucocythæmic. There is no evidence of pigmentation." Dr. RICHARD HESCHL—*Ueber Pigmentbildung nach Febris intermittens. Zeitschr. der kais. kön. Gesellschaft der Aerzte zu Wien*, Bd. I, 1850, S. 338—describes the pigment as consisting partly of dark-brown and partly of dark-violet bodies about as large as blood-corpuscles, some enclosed in cells and the others as detached or adherent in masses of twenty or thirty granules, generally lying close to the coats of the vessel. A subsequent article—*Ueber das Wechselfieber und die eigenthümlichen Blutungen in der Melanämie. Oesterreichische Zeitschrift für Praktische Heilkunde*, Wien, Bd. VIII, 1862, S. 305 *et seq.*—gives among others the following conclusions: The peculiar pigment of intermittent fever comes neither from an arrest of blood in the vessels, which VIRCHOW holds as one of the conditions of its occurrence, nor from hæmorrhage, but from the coloring matter of the blood leaving the blood-corpuscles. The coloring matter is communicated to the coats of the vessels, and may there be found at first as a reddish, and later, oftentimes as a dark-brown substance; while the corpuscles not entirely deprived of their coloring matter continue to circulate with the rest of the blood as small reddish-looking bodies. The principal seat of this pigment-formation in severe cases is the brain, and in mild cases the liver or spleen. This peculiar hue of the coloring matter of the blood is due to the action of malaria, as it is observed only in cases of disease arising from this cause. Dr. JUL. PLANER—*Ueber das Vorkommen von Pigment im Blute. Zeitschr. der k. k. Ges. der Aerzte zu Wien*, 1854, Bd. I, S. 126 *et seq.*—found pigment in the spleen, liver and brain of the subjects of intermittent fever. Blood taken from the living subject contained a multitude of

The varying and sometimes healthy condition of each of the organs presented in these records gives assurance that no one of them is entitled to have its changes from the normal state regarded as pathognomonic of malarial disease. The opinion of MAILLOT connecting the disease with a hyperæmic condition of the nervous matter and its membranes, that of STEWARDSON, holding the bronze coloration of the liver as essential, and that of many French writers, associating the febrile manifestations with enlargement of the spleen, are rendered equally untenable by this one consideration. MAILLOT considered the hyperæmia to be the cause of the fever and not simply an accompanying anatomical fact. STEWARDSON was content to regard the liver-change as pathognomonic, without insisting on its being the cause of the morbid phenomena, since there was no evidence that it existed at the commencement of the fever and the early symptoms could not be traced to it as their source. The enlargement of the spleen, so long known to be associated with malarial disease, and the softening and occasional inflammatory appearances presented by it are undoubtedly suggestive of an intimate relationship between the fevers and the changed condition of the organ. AUDOUARD* held the tumefaction to be the effect of a congestion which preceded and determined the fever. At that time medical opinion generally considered malarial fever as an affection of the nervous system, the particular seat of which remained involved in obscurity, while the affection of the spleen was regarded as connected with an obstacle to the circulation in the portal system not pertaining exclusively to intermittent fever.† Following AUDOUARD, PIORRY concluded that the tumefaction was essentially a

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brown and black masses similar to those often seen in *post-mortem* blood. But cell-like pigment bodies were constantly found. Dr. PLANER admits that the subject of pigment-formation is as yet far from being understood to its full extent, and that there is nothing in his observations to enable us to decide upon the manner or place of its formation. FRERICHS describes the pigment found in the blood as usually in the form of small rounded or angular granules, sometimes sharply defined and at others surrounded by a brownish or pale margin. They are occasionally isolated, but more frequently held together in small aggregations by a pale hyaline connecting substance. The groups are rounded, elongated or irregularly branched. True pigment-cells are also observed, although in smaller numbers than the granules and granular masses. The color is usually deep black, more rarely brown or ochre-colored, and least frequently reddish-yellow. The pigment exists in greatest abundance in the blood of the portal veins. He regards it as formed chiefly in the spleen, as the spindle and club-shaped cells with rounded nuclei in the blood resemble those which are found along with free granules in the spleen. But he conceives that the liver also may be concerned in the production of the pigment, as in one case of death after a protracted quartan the spleen was enlarged, lardaceous and completely free from pigment, while the liver contained considerable quantities. A. KELSCH—*Contribution à l'Anat. Path. des Maladies Palustres endémiques. Archives de Phys. normale et path.*, 2e série, t. II, 1875, p. 691. This investigator counted the number of blood-corpuscles in seventy cases of acute and chronic malarial poisoning at the hospital at Phillipeville in 1874–5 and found an invariable diminution in the number of the red corpuscles (oligocythæmia). Twenty to thirty days of simple remittent, quotidian or tertian fever reduced the number from five millions to one million, or even as low as half a million per cubic millimeter. He observed that a quotidian or remittent fever, on its first invasion, would reduce the number of globules as much as two millions per cubic millimetre in four days or even one million in a single day. But usually, as soon as the oligocythæmia was established, at one to two million globules per cubic millimetre, it remained stationary or nearly so. The white globules were also generally diminished in number, and proportionally even more than the red, notwithstanding the enlargement of the spleen; their number was one to one, two or three thousand red: but there were exceptions to this: in a few cases the white corpuscles were relatively more numerous than in health. He counted in particular instances 1 to 192, 118 or even 112 red. These blood-changes are more rapid during the first few days of the fever; they continue, but more slowly, for a longer period, and then remain stationary or nearly so. While the red corpuscles were found to be diminished in number their transverse diameter was increased, in some instances to 11, 12 and even 13 micromillimetres; the smallest mean in fourteen cases, in each of which one hundred globules were measured, was 7.889 and the largest mean 9.429 micromillimetres. In pernicious fever there is a rapid diminution in the number of the red corpuscles, amounting to from half a million to a million a day at the beginning of new cases; but in those that supervene on previous malarial anæmia the decrease is less rapid, from 100,000 to 200,000 a day. In these cases the white corpuscles are relatively and absolutely increased in number; there may be as many as 1 to 200 or even 70 red, in this respect differing from the blood in ordinary agues. He observed pigment in the white corpuscles of the blood twenty-four times in twenty-four cases of pernicious fever. In forty-seven chronic cases he had twenty-one negative and twenty-six positive results; of the latter twelve were observed during life, the others after death. He never found pigment in the peripheral vessels unless the portal and splenic veins, the liver, spleen and bone-marrow were saturated; on the contrary, in fourteen autopsies he found it in these internal parts, although there was none in the peripheral vessels. In eight cases of ordinary ague, on pricking the finger immediately after a paroxysm, he found the pigment five times. In a later paper—*Nouvelle Contribution à l'Anat. Path. des Maladies Palustres endémiques. Archives de Phys. normale et path.*, 2e série, t. III, 1876, p. 191—KELSCH states that during the intermittent attack the leucocytes diminish in greater proportion than the red corpuscles. The diminution is rapid and continuous, reaching as low as one-half or one third of their number before the attack. One or two days are required for their re-establishment. The swelling of the spleen is coincident with their disappearance; but these phenomena are not proportionate. In the cachectic cases the leucocytes are diminished, but not in proportion to the splenic enlargement.

* *Jour. Gén. de Méd.*, t. LXXXIII, Paris, 1823, p. 245.

† At a later date Dr. EISENMANN, in an article on the proximate cause of enlargement of the spleen in intermittent fever and fevers generally, in the *Archiv für die gesammte Medicin*, B. V, Jena, 1843, S. 401, refers the tumefaction of the spleen to the chill. He was led to this opinion by reading the histories of two cases, one of hepatic phlebitis brought on by a fish-bone, which, in its progress from the stomach, had transfixed the superior mesenteric vein, and the other a case of rupture of a metastatic abscess into one of the hepatic veins. In both there were repeated chills with splenic enlargement. He considers, therefore, that since we have tumefaction of the spleen in varieties of fevers which in their origin, nature and indications are wholly different, we may enquire whether this enlargement does not belong to the fevers as such, originating in the febrile movement, no matter on what cause the latter is dependent. During the chill the capillaries are greatly contracted and the blood partly or wholly excluded from them, in consequence of which

congestion, although inflammatory changes might in progress of time appear, and was inclined to view the fever as connected with the condition of the spleen.* NELET† strengthened this view by reporting a case in which an inflammation of the spleen caused by external violence was immediately followed by intermittent fever which was cured by quinine. COHADON‡ in his thesis argued in behalf of PIORRY's theory, that intermittents are due to a pathological condition of the spleen and of the portions of the nervous system which correspond with that organ. PÉZERAT,§ however, was the most outspoken advocate of the view that intermittents are due to an inflammation of the spleen. His principal argument was the existence of tumefaction and pain in the organ, but it was shown by NEPPLE,|| NIVET¶ and others, that while this pain is absent in many intermittent cases it is present with tumefaction in other diseases, as typhoid fever, in which there are no intermittent symptoms. The very character of the fever was an obstacle to the acceptance of PÉZERAT's views, as the tendency of inflammation, once established, is to progress not to intermit. Moreover, GENDRIN had already shown that the tumefaction occurs without inflammation or other material change in the intimate structure of the organ. The enlargement was therefore held to be the effect, not the cause, of the febrile manifestations. Finally, DUTROULAU** argued that while the state of the spleen is the most frequent and marked characteristic of malarial fevers, and sometimes one of the causes of grave symptoms, it is neither the point of departure nor the seat of the febrile phenomena.

But before, and during the continuance of, this contest as to the connection of splenic engorgement with the intermittent phenomena, there was an underlying idea that the condition of the blood stood in a peculiar relation to the organ and occasioned its congestion. One of GENDRIN's conclusions points to vitiation of the blood. NIVET held that in intermittents, as in scurvy and typhoid fever, in which also there is engorgement, the disease is general and the blood probably altered. Even PIORRY regarded a change in the blood as antecedent to the pathological condition of the spleen. Some light was thrown upon this point by the discovery of the pigmented condition of certain of the viscera in malarial fevers. FRERICHS considered that the disorganization of the blood was effected in the spleen, suggesting in explanation that during the stasis which takes place in the blood-current as it passes from the arterial system into the splenic sinuses, a stasis which is augmented in the congested state of the organ consequent on malarial fever, conglomerate masses of blood corpuscles are transformed into pigment, which is afterwards arrested in the capillaries of the liver, brain, kidneys, &c. The spleen, however, could not be considered the only organ actively concerned in the disorganization, as much pigment had been found, in one case, in the liver, while there was but little in the lardaceous spleen. But

the larger vessels and heart become overloaded. In this turgescence the spleen has a great share, as it seems designed for the reception of blood in a disordered state of the circulation, to obviate thereby the dangers arising from such disturbance. He alludes to the fact that splenic enlargement may arise from disordered circulation resulting from heart disease, as shown by BRERA—(*Rapporto della clinica di Padova*, 1812, p. 12); NASSE—(*Horn's Archiv*, 1819, August, S. 120), and SOUCHOTTE, (*Mém. de la Soc. de Méd. Prat. de Montpellier*, t. XX, p. 243–254)—and inquires why there should not be an overcharging of the spleen with blood, and a consequent enlargement, in a disturbance of the circulation due to spasm of the capillaries in the chill of fevers. He concludes that since all the facts and direct observations indicate that the chill causes the splenic engorgement, this condition will be found in every fever which begins with a chill, and will be most marked in intermittents, because in them the chill is not only more severe than in other febrile diseases but more frequent in its recurrences. So also in the fever arising from purulent infection, where the chills return frequently the enlargement of the spleen will be marked; but in those having only a single chill the augmentation naturally cannot be so great. Besides the character of the fever the tone of the tissues seem to have an influence on the enlargement; for in adynamic fevers in which the tissues have lost their tone the spleen will make less resistance to the blood forced upon it in the cold stage, and in time will have less power to remove the accumulated blood, than in sthenic cases in which the tissues remain vigorous. In irritative and inflammatory fevers the splenic enlargement need be sought for only while the chill lasts, and no great increase need be expected, while in asthenic forms it is not only great but of longer duration.

* *Mémoire sur l'état de la rate dans les fièvres intermittentes. Gazette Médicale*, 1833, p. 393.

† *Archives Générales de Médecine*, 2e serie, t. V, 1834, p. 137.

‡ COHADON—*Collection des Thèses*, Paris, 1847, t. III, No. 31.

§ *Archives Générales de Médecine*, 2e série, t. V, 1834, p. 199.

|| NEPPLE—*Gazette Médicale*, t. IV, 1833, p. 613.

¶ NIVET—*Annales de Méd. Belge*, t. II, 1838, p. 25.

** *Op. cit.*, p. 195.

the valuable researches of KELSCH appear to warrant his conclusion that the pigment is formed in the mass of the circulating blood and is deposited therefrom in the substance of those organs when a stasis in the circulation affords conditions favorable for sedimentation. He regards the splenic melanosis as secondary to the appearance of the pigment in the blood because in two of his cases there was little deposit in the spleen while the blood was charged with masses of pigment, and because the deposition of this melanæmic pigment is conducted in the same manner as that of other matters, such as cinnabar, which have been artificially introduced into the circulation.* In a later paper KELSCH† concludes from his many observations that the presence of this pigment in the blood is a pathognomonic sign of acute malarial poisoning; that it is not found in chronic cases in the absence of febrile accessions, and that it is an intermittent phenomenon allied to the other intermittent manifestations of acute impaludism, with which it appears and disappears.

In summarizing the *post-mortem* records left by our medical officers it is evident, not only that the condition of no one organ is the cause of malarial manifestations, but that these are due primarily to a morbid condition of the blood. In this way only may death be accounted for in cases characterized by alteration of the blood with but little enlargement of the liver or spleen. In this way also may be explained the pigmentary deposits associated with stasis of the blood, from engorgement as in the spleen, or from congestion or inflammatory conditions in other organs as the liver, brain or intestinal canal.

The change in the blood is presented as of two different characters: one in which it was thin and watery with a tendency to effusion and separation of fibrin; and the other in which it became black and disorganized. The former was its condition in intermittent and chronic cases, as indicated by such symptoms as anæmia, debility and effusion, and by the *post-mortem* appearances in those cases in which death occurred less from the intensity of the poisonous influence than from some accidental circumstance, as heart-clot in cases 95 and 96, or from the effects of some complication, as in case 75. The latter was its condition during pernicious attacks. These changes were produced in the blood by the operation of the malarial influence. If they are regarded instead as due to the action of the enlarged or softened spleen, which was so frequently present, the disorganization of the blood would be proportioned to the splenic alteration. But the presence of blood capable of continuing life in a patient whose spleen weighed sixty-eight ounces, case 100, is inconsistent with the idea of the participation of this organ in the disorganizing process. In other cases death occurred from altered blood although the spleen weighed only a few ounces more than usual. The notably enlarged spleen is a characteristic of chronicity; it corresponds to a mildness of the poison, as where the disease occurs in temperate climates, or to an accommodation of the system to pernicious doses, where it occurs in highly malarious localities. On the other hand, in some of the fatal remittents the spleen was found to be unaffected. Instead, therefore, of regarding this organ as an active agent in the disorganization of the blood, its action may plausibly be considered as conservative, preventing dangerous congestions in other organs by its enlargement, and preserving the blood from that diffluent and black condition which is the concomitant and probable cause of the more dangerous pyrexial manifestations. It may be that the action of the spleen is mechanical: as suggested by

* LANZI and TERRIGI—*Il miasma palustre*, Roma, 1875—connect malarial diseases with certain dark-colored granules found in the cells of microscopic algæ, which in the winter cover the Roman Campagna, but die under the heat and dryness of the summer and are converted into a dark-colored *humus*. The dust particles from this are affirmed to be identical with the black pigment of malarial disease, and to act as a ferment when introduced into the human system.

† A. KELSCH—*Contribution à l'histoire des maladies palustres—De la Melanémie—Archives Gén. de Méd.*, 7me serie, t. VI, 1880, p. 385.

KELSCH. the pigment-masses may be removed from the circulating blood by a process of sedimentation; but the hypertrophy which is so frequently found in chronic cases appears to indicate that there is a vital action involved in the removal of the malarial poison from the blood and in the regeneration of the latter after its disorganization by the morbific agent.

V.—CAUSATION OF MALARIAL DISEASE.

The following extracts from sanitary reports have been selected from many of a similar tenor as indicating the views of our medical officers on the causation of malarial disease:

Surgeon F. L. DIBBLE, *6th Conn. Vols., Dawfuskie Island, S. C., March* 31, 1862.—The regiment remained at Hilton Head, S. C., during the first twenty days of January, 1862, when it was ordered to embark—about 800 strong—on the steamer *Cosmopolitan*. The boat at best was not capable of accommodating over four hundred men for any length of time. From some unexplained cause the command was kept on the crowded transport for five days in the harbor of Port Royal and for fifteen more in Warsaw Sound, when it was ordered to encamp on Warsaw Island, Ga. The side of the island where the troops were landed did not afford sufficient dry land to lay out a regular encampment, and the tents of the men were huddled together without regard to order. What we saw of the island was one vast swamp. The climate is nearly the same as at Hilton Head, generally mild and equable. The disease that particularly affected the regiment at this place was the congestive or pernicious fever of the coast, which raged for the first five days after we landed with almost incredible violence. Of the fatal cases not more than two lived twenty-four hours after the commencement of the attack. While at Warsaw Island the only duty exacted of the troops, besides the usual guard and picket duty, was about three hours daily drill. The command remained on shore about nine days, when it was ordered to re-embark on the little transport, and there we lay lazily at anchor for the eleven succeeding days in Warsaw Sound. At the expiration of this time General Sherman, by advice of the Medical Director, ordered the return of the regiment to Hilton Head. It should be stated, however, that when the order came to return no fatal case had occurred for the previous twelve days. For the next twenty days the regiment remained at Hilton Head, when it was ordered to the support of General Viele at Dawfuskie Island, S. C. [The report of sick and wounded from this regiment for the quarter ending March 31, 1862, gives a mean strength of 932 officers and men, among whom were 22 cases of congestive fever with 11 deaths.]

Surgeon JAS. H. THOMPSON, *12th Me. Vols., New Orleans, La., October* 1, 1862.—The vicinity in which the above-mentioned companies were stationed is, if possible, more marshy and unhealthy than the rest. The marshes are irregularly intersected with deep sluggish bayous and lagoons; this fact, in connection with the effluvia from the canals or sewers before mentioned, explains the large number of intermittent and continued fevers reported.

Surgeon JAMES BRYAN, *U. S. Vols., opposite Vicksburg, June* 27, 1863.—The vicinity of the great swamps near the Mississippi permitted the malaria to be borne by the prevailing winds to the locality of our hospital, and convalescents and patients from this cause were liable to new attacks and relapses. The only efficient preventive, judiciously administered, was quinine. This was found a sure prophylactic; but becoming scarce we had to resort to cinchona, which, in larger doses, we found to be equally effectual both as a prophylactic and a remedy.

Surgeon S. K. TOWLE, *30th Mass. Vols., December* 31, 1862.—July 1, 1862, the regiment was in bivouac on the swampy point opposite Vicksburg, where it had been about ten days. This whole locality had just emerged from an overflow of many weeks' duration, and was still barely passable through mud and water from ankle to armpit deep, the slope of the level being the only place upon which the men could sleep. About the 10th the bivouac was changed to alongside the canal or cut-off being dug across the bend of the river through a heavily wooded swamp—thus adding the deleterious influence of large quantities of fresh soil of vegetable origin, daily thrown up, to that already experienced from the thick deposit of the long flood. This position was occupied to the end of the month, when the place was evacuated. During this time the men had no tents, but were required to build booths of branches as a partial protection from rains and heavy dews, and to construct platforms of poles two or three feet high upon which to sleep. Moreover, the duties were very severe. At first, on account of the mud and water in laying out the canal and cutting the trees from its course, many of the men were wet day and night; after this, digging the cut-off entailed similar hardships and exposures. There were also frequent alarms at night and much guard, picket and scouting duty, exposing them greatly to both dew and sun. Drills were also ordered, after the first few days, from 5 to 7½ A. M. (practically before breakfast) and again for two and a half hours in the afternoon. The diet was exclusively, as it had been with but slight exceptions since leaving Massachusetts in January, salt meat and hard bread, and many of the men exhibited in consequence the preliminary symptoms of scurvy. All the circumstances tended to depress the spirits, and there was no prospect of any change for the better unless the entire object of the expedition was abandoned.

As the immediate result of this long exposure to intense malaria under circumstances tending to still further increase disease, a malignant form of remittent fever became very prevalent, with a strong tendency to take on the congestive type. Out of the eight hundred picked men (one hundred and fifty feeble and second-rate men had been left behind) eighteen died in the swamp, while at the time the regiment left that position more than half of the entire

force was on the sick list, two hundred being in hospital and more than that number sick in quarters. The hospital accommodations were negro huts and steamboat decks, with no beds, bedding, stores or provisions other than rations, obtainable excepting by seizure.

During August the regiment was at Baton Rouge, La., where on the 5th it took part in the battle, losing four killed and eighteen wounded. The sick list during this month was never below four hundred, almost entirely from malarial diseases, chiefly remittent fevers. In September and October the regiment was encamped near Carrollton, La., on the so-called Metairie ridge, near the swamp extremity of the fortifications defending New Orleans from attack from up-river. This ridge at the point of encampment is but a few feet above the heavily wooded swamp within gunshot on either side, and with the exception of the fresh deposit of decaying vegetable matter, was but little if any improvement over the swamp opposite Vicksburg, producing the same class of diseases, although somewhat less pernicious in type. At Baton Rouge and Carrollton the men got vegetables enough to eradicate the scorbutic symptoms, and the labor and exposure were less; but the sick list did not fall at any time much below four hundred, and generally three hundred were in the hospital. Nearly all those who had remittent fever from the exposure at Vicksburg had repeated attacks at Carrollton, and of the few who had escaped up-river not one, officer or private, escaped illness from the effect of malaria at the latter locality. Although the general type of malarial disease was somewhat less severe at Carrollton than at Vicksburg, the men had become so debilitated by repeated attacks that the mortality was no less. There also resulted a class of chronic cases, with diarrhœa, anasarca and anæmia, tending apparently irresistibly to death by exhaustion of the vital powers. Hospital accommodations were much better than while up the river, and gradually became quite good, while the facilities for a proper diet were also much improved.

In November and December the regiment was quartered at the U. S. barracks four miles below New Orleans, where, with but nominal duty, little exposure, good diet, dry airy quarters and a generally cheerful and contented feeling, the men have steadily improved in health and strength. But while this has been true in general terms of the regiment, there have been many relapses, and in many cases the system has seemed so thoroughly poisoned by long exposure, under the most unfavorable circumstances, to malarious influences as intense as could be found in the South, that no response would follow the exhibition of stimulants or the most nutritious food, but death would inevitably occur from exhaustion or debility alone.

The treatment followed has been simple from necessity, if not from choice; for the majority of the cases have been treated in the regimental hospital with only the limited variety of supplies furnished for field service. Sulphate of quinine has, of course, been the great reliance, and in no case of intermittent fever, in which anything approaching a fair trial could be had, has it failed in effecting a prompt cure. Cases of malarial fever treated in houses (contrary to the results of my experience with typhoid fever on the Potomac) have progressed much more favorably and rapidly than those in tents, and cases in Sibley tents have proved less tractable and more liable to a relapse than those in wall tents with a fly. Indeed, in this climate, in summer a fly is indispensable for comfort either in the hot sun by day or the heavy dews at night. Capsicum has proved of great value in conjunction with quinine, especially in cases requiring stimulants, as after the first most of them did. Mustard in the form of large poultices was more useful than when applied with baths, and, especially in the congestive cases, was of the first importance. Of stimulants, ale was the most universally beneficial, and but few instances were noted in which it failed to act kindly.

The total mortality in the regiment during the six months, in general as well as regimental hospitals, was two hundred and two, or *one-fifth* the aggregate strength July 1, which was one thousand and eleven. Of these 114 died during the quarter ending September 30 and 88 during the last quarter. The aggregate, December 31, 1862, is seven hundred and thirty.

Surgeon J. M. Allen, *54th Pa. Vols., May* 31, 1862.—The regiment is on duty in the valley of the Potomac. This region of Virginia is proverbial for almost every variety of miasmatic fever, and when the peculiar nature of the climate, hot days and cold nights, is taken into consideration in connection with frequent overflows and rank undergrowth, the cause may be easily explained. The diseases incident to the vicinity are remittent, intermittent, typhoid and congestive fevers, pneumonias, diarrhœal and bronchial affections.

Surgeon Robert Morris, *9th N. Y. Vols., Key West, Fla., April* 1, 1862.—The ponds in this vicinity are a fruitful source of disease; for the rains wash into them a large quantity of vegetable matter, which, during the process of decomposition, evolves so much malaria or bad air that the odor is very offensive, particularly when the wind blows over them towards the camp. One of these ponds, that nearest the encampment, has recently been filled up, and no doubt the salubrity has been thereby much increased.

Surgeon A. W. Woodhull, *9th N. J. Vols., Carolina City, N. C., June* 1, 1863.—Some of the posts at which portions of this regiment have done picket duty have been extremely unhealthy. Particularly is this true of Havelock, a post on the railroad, eight miles from Newport barracks and sixteen miles from New Berne, N. C. It is situated in a low wet swamp on the border of Slocum's creek, which is here dammed for water-power. In the spring of 1862 the dam washed away, leaving a large extent of surface which had been covered with water. This place became extremely unhealthy, developing intermittent and remittent fevers in great abundance. The record shows that 98 per cent. of the men of this regiment, who had been stationed there more than ten days, were attacked by one or the other of these fevers. For a time they were kept subdued by administering daily portions of quinine, but the supply being suddenly cut off, they reappeared with greater frequency and increased severity. It is believed that a sufficient supply of quinine will prevent at such places the prevalence of these fevers to any serious extent.

Surgeon A. W. McClure, *4th Iowa Cav., near Helena, Ark., September* 30, 1862.—On July 1 we were encamped on the White river at Jacksonport, Ark., perhaps the most malarious locality in the State. Our fevers were then,

as they had been for some months previous, of a malignant character. On the 6th we moved down the river on short notice. Miasmatic fevers prevailed to a considerable extent, but of a mild character. After the last of July we reached this place. Our brigade has since been encamped six miles west of the town in a position as healthy as any in this vicinity, although the low swampy lands surrounding us are much to be dreaded, and will soon have no less power against its poisonous influence. Intermittent and remittent fevers have readily yielded under the use of quinine; but the atmosphere is impregnated with poison that causes a strong tendency to a return of relapses. After a repetition of the attacks, in every case a severe and protracted form attacks, diarrhœa has supervened, attended with cachexia, and we have found it necessary to remove the patients to northern hospitals: nearly all such cases, however, have terminated by being discharged and put upon a furlough.

Surgeon H. F. CONRAD, *17th Pa. Vols., Beaufort, S. C., April* 30, 1863.—The camp we now occupy is situated on Port Royal, one of the sea islands, a sandy point. Immediately in the rear of our location passes an arm from Coosaw river. This inlet is about one-fourth of a mile wide. When the tide is in it is filled with water, but is left bare when the tide recedes. Long swampy grasses cover its bed, giving rise to an abundant miasmatic influence from the decomposed vegetation. As the warm weather advances a still greater quantity of the miasmatic poison will be generated. The prevailing disease is intermittent fever, which has increased considerably within the last two weeks, and is generally of the quotidian type. It has on the whole assumed no severe symptoms. I generally commence with a purgative dose of calomel, followed, if necessary, by a dose of oil, rhubarb or salts. I then put the patient on sulphate of quinine, from twelve to twenty grains daily, divided into three or four doses. This seldom fails to check the paroxysms; yet I generally continue the quinine for some time to prevent the recurrence of the disease. I observe that it requires larger quantities of quinine to act efficiently in this climate than in our northern States, no doubt from the miasmatic influences being more powerful in this region than in the north. I have not as yet had any case of bilious remittent fever, but anticipate its prevalence as the summer months advance.

Surgeon S. N. SHERMAN, *34th N. Y. Vols., Seneca Mills, Md., October* 1, 1861.—Chills and fever have resulted, but only in those doing guard duty on the river, and of these attacked few fail of a night passage when quinine is liberally used and active movements to camp enjoined. With the approach of the frosts of autumn the number of attacks decrease and the recoveries are more speedy. But the diseased ha[illegible] the benefit of the regimen would be good.

Asst. Surg. JAMES B. HUNTER, *69th Ind. Vols., on the peninsula of Virginia, near Yorktown, Va., August* 31, 1862.—It is worthy of remark that the sick reports of the 16th N. Y. Inf. and the 3d Ind. Cav. show a much larger percentage of cases of intermittent fever than those of the 69th and 63d Ind. Vols., for the same time and under similar circumstances as far as camps and duties are concerned. The practice adopted [illegible] in favor of the last two regiments is not due, at least in part, to the fact that they are [illegible] while the other commands have only the imperfect protection of the shelter tent, to which in bad weather the men cannot keep their clothing or blankets even tolerably dry, and under which they are [illegible] exposed during the night to currents of air probably charged with malarious poison. The 16th N. Y., a [illegible] and remittent fevers have been the prevalent diseases, prophylaxis has been attempted with fair success by the administration to the portion of the command most exposed of a spirituous infusion of willow bark.]

Asst. Surg. ALEXANDER INGRAM, *U. S. Army, 2d U. S. Cav., Sharpsburg, Md., September* 1, 1862.—The first two months of the quarter were passed on the Peninsula, where the men were exposed to excessive heat and miasm. Add to these agencies the influences of water tainted with alluvial and animal matters, and the exhalations from the various unwholesome accumulations incident to a crowded camp, and the essential causes of sickness in the command will be comprised. These various causes resulted in irregular malarial diseases, nearly every case being benefited by the administration of quinine,—intermittent fevers, remittent fevers and diarrhœas characterized by torpidity of the liver. That the malarial fevers did not assume a typhoid type, as was the case in many instances, I attribute to the superior cleanliness of the men in person and camp, and temperance in food and drink, they being old and disciplined soldiers.

Surgeon CHARLES J. NORDQUIST, *83d N. Y. Vols., near Sharpsburg, Md., October* [illegible], 1862.—[illegible] command was ordered to the scene of the Ball's Bluff disaster, and while at Conrad's ferry it was exposed to a drenching rain-storm for eighteen hours. The men were without shelter of any description, and remained in their wet clothing for forty-eight hours; this, in connection with the insanitary conditions of their camp at Muddy Branch, decaying vegetable matter, a [illegible] water well and privies [illegible] a source of disease in their midst. Remittent, intermittent, bilious and typhoid fevers prevailed to an alarming extent, [illegible] ment succumbed to the evil influence exerted on their systems by the above-mentioned causes.

These reports, as also occasional references in those published in the first part of this work,* indicate the belief of our medical officers in the identity of origin of all the so-called malarial diseases from simple languor and loss of strength, with slight splenic enlargement or hepatic derangement, to the [illegible] fevers which [illegible] of these various and clinically dissimilar morbid phenomena are [illegible] tion from certain soils, especially those which were [illegible]

*See, for instance, in the Appendix the reports of Surgeon [illegible]

natural process of decomposition under the combined influence of heat and moisture. Hence swamps, marshes, river-bottoms liable to flood, bayous, lagoons, ponds, dams and canals were deemed sufficient to account for the presence of disease, especially towards the close of the summer season, when the heat was believed to operate indirectly, by lowering the water-level and exposing larger surfaces of moist soil, as well as directly in promoting the generation and evolution of the malarial miasm.

The disease-cause was recognized as moving, cloud-like upon, and for some distance along, the slopes which faced its marshy source: and as capable of being carried in dangerous concentration for considerable distances by winds passing over such extensive swamps as are found in the Mississippi bottom. Its greater concentration or more malignant character at night was illustrated by the frequency with which men were seized while on night duty. Dr. HUNTER, indeed, refers to the greater prevalence of the disease among men who slept in shelter-tents, the open ends of which gave free exposure to the air, than among those who, other things being equal, were better protected by the wedge or 'A' tents.

It is manifest, however, that the presence of absolute swamps or marshes was not considered essential to the development of the miasm, as it was attributed to cotton-lands and other soils where vegetation was rank. FRINK noted the prevalence of intermittents in some regiments camped in a strip of timber on rather low ground. The cutting down of trees for firewood or for the building of huts, corduroy roads, breastworks, bomb-proofs, abatis and other military works was frequently followed by the development of malarial fevers. As in civil life similar consequences have often been ascribed to the clearing of timbered lands, the exposure of the soil to an increased solar heat was regarded as the cause of the newly developed insalubrity. And, as in the inception of agriculture in a new country, the removal of undergrowth and the upturning of the soil are so frequently followed by malarial manifestations or the aggravation of pre-existing diseases, it seems likely that no inconsiderable proportion of such diseases in our armies may have been owing to the clearing of the surface and disturbance of the soil incident to the process of going into camp. It is certain that many of our medical officers recognized this possibility, and were as earnest in their efforts to preserve the natural integrity of a camp-site which appeared free from malarial factors, as to drain and improve one which was manifestly insalubrious.

But a soil capable of evolving malaria under the theory of organic decomposition was repated, in one exceptional instance, as exercising no injurious effect on the health of the troops camped near it:—

Ass't Surg. GEORGE H. HORN, *2d Cal. Cav., Camp Independence, Owen's Valley, Cal., April* 1, 1863.—**The great extent of swamp-land might be supposed to cause miasmatic disease. No case has, however, been known to arise. All the causes favorable to the development of such diseases exist. Their absence can only be accounted for by the extreme dryness of the atmosphere and the quantity of saline materials in the soil and water.**

It is probable, however, that the swamps of Owen's Valley are as malarious as those of the river-bottoms in Arizona, where the climate, soil and vegetation are of a similar character, and that the absence of malarial manifestations reported by Dr. HORN was due to the absence of exposure. After the establishment of Fort McDowell, Arizona Territory, on the dry mesa sloping towards the Verde river-bottom, the garrison remained free from malarial disease for over a year. At the end of this period Indian hostilities called detachments of the garrison into the field, and coincident with their exposure in temporary camps in the river-bottoms malarial fevers appeared among them. Camp Independence was established three miles from Owen's river, on high ground bearing only scattered patches of

bunch-grass and sage-bush. At the time Dr. HORN made his report the post had not been garrisoned for more than a year. Its later records show the presence of malarial fevers.

On the other hand, malarial diseases of a pernicious character are reported in one instance where the surroundings are said to have been inconsistent with the theory of organic decomposition :—

Surgeon W. W. BROWN, *7th N. H. Vols., Fort Jefferson, Tortugas, Fla., June* 30, 1862.—There seems to be no cause for malarial disease, as the waters of the Atlantic Ocean constantly bathe the walls of the fort; yet three or four cases of very severe and malignant congestive fever occurred in rapid succession, though nothing of that character has since appeared.

The records of Fort Jefferson show the prevalence of malarial affections;* but, although there is little surface-growth, the absence of organic matter in the soil may not be admitted. On the contrary, the soil appears rich in the elements of vegetable growth; for at Key West, where a similar coral-sand is raised a few feet above the salt-water level, it is covered with a thick chaparral, and produces under cultivation nearly all the tropical fruits and vegetables.†

A review of the observations bearing on the relation between vegetation and malarial disease appears to indicate that the poison of the disease is elaborated during the reduction of nitrogenous organic matter into the inorganic form in which it is available for absorption by growing plants, and evolved from the surface as malaria when the living vegetation fails to absorb all the richness of the prepared nutritive material. Thus, in the diurnal changes, malarial exhalation ceases when the vitality of the plant is at its maximum under the influence of the sun's light and heat, and becomes active during the night, the period of vegetable repose. Our spring fevers occur when, with the northward advance of the sun, the earth becomes heated before its surface is covered with the new vegetation. During the summer, when vegetable life is in full activity, malarial diseases do not increase in proportion to the increasing heat of the season. In the autumn the hot sun and occasional rains continue the processes going on in the soil, but the natural decay which succeeds to the fructification of the annuals interferes with absorption and malarial diseases assume an increased prevalence and malignancy.

The association of autumnal fevers with vegetable decay led to the belief that the putrefaction or decomposition of vegetable tissues was directly connected with the febrile occurrences. But it is well known that free exposure to the effluvium from decomposing vegetable masses does not develop malarial affections. It is only when this vegetable matter has been mixed with soil and is undergoing the fermentative processes which result in the nitrification of organic ammonia that the presence of malaria is manifested. Seasonal observations made in the tropics give testimony agreeing with that of the temperate zones. The dry season is the analogue of our winter; but while with us soil-fermentation is held in check by cold, in the tropics moisture is the lacking factor. With the first showers of the rainy season some cases of fever occur. ALIBERT‡ explained these sudden developments by enunciating his sixth proposition: "Rains which fall in very hot weather may contribute to the production of malignant intermittents by setting at liberty putrid vapors which had been confined beneath the hardened surface of the earth." But they correspond to our vernal intermittents, and may be referred to the same cause, the presence of the conditions needful to soil-fermentation and the absence of growing vegetation. As the

* "The prevailing diseases are malarial fevers, usually mild, and catarrhal affections." *Hygiene of the U. S. Army. Circular No. 8, S. G. O.*, Washington, D. C., 1875, p. 140.

† Work last quoted, p. 144.

‡ ALIBERT—*A Treatise on Malignant intermittents.* Caldwell's translation, Philadelphia, 1807, p. 182.

rains continue the country becomes covered with an exuberant verdure, and the malarial manifestations are lessened, but only to break out with increased virulence when this annual growth wilts and decays at the end of the rainy season.*

Malaria may therefore be considered due to a want of relation between the nutritive elements of the soil and its living vegetation. When thus viewed, malarial developments following a removal of the natural growth in the preparation of the ground for agricultural purposes are readily explained. Their subsequent disappearance when, by drainage and cultivation, a proper relationship has been established between the soil and its crop, is an obvious consequence. Exhalations from a parched soil bearing a withered vegetation, as noted by FERGUSON in rocky ravines, river-bottoms and bare open hollow lands in the Iberian Peninsula, are also understood, as well as his remark that a healthy condition of soil in these pestiferous regions was infallibly regained by the restoration of the marshy surface to its utmost vigor of vegetable growth.† There was underlying moisture in these rocky ravines and temporarily dried up water-courses. So at Fort Jefferson, Fla., a rich organic soil with underlying moisture, a high temperature and absence of living vegetation may be accepted as the conditions which permit of malarial exhalation.

Oftentimes men in the full vigor of health were struck down by the miasmatic influence, but in general the operation of predisposing conditions was recognized. These are variously enumerated, but all undoubtedly acted by lowering the vital powers and rendering the system less able to withstand the influence of a superadded miasm. Most of the conditions affecting the soldier on active service were of a depressing or exhausting tendency. He was often hungry; his food was not unfrequently poorly cooked; the issues of hard bread and fresh meat at times occasioned diarrhœa; the sameness of diet developed a scorbutic taint. One reporter, indeed, regarded the ration as the most powerful of the predisposing factors, the excess of its carbonaceous elements inducing a congestion of the portal system which opened the way to malarial attacks.‡ While generally warmly clothed, the soldier was often chilled at night, or after profuse perspiration or exhaustion from fatigue. He was exposed to rains, and had to remain in his wet clothes for days at a time, sleeping on the wet ground without shelter. At other times the exhaustion was consequent on forced marches or excessive labor under an oppressive sun. The water-supply was generally surface collections, often foul naturally, and usually tainted by the inflow of the surface washings and drainage of neighboring camps. Lastly, a state of mental depression arising from absence from home, domestic concerns, impending personal or public danger, etc., was considered as adding to the predisposition.

Hot days and cold nights are mentioned by Surgeon ALLEN as predisposing the system to malarial attacks; but OLDHAM's theory, that malaria is chill,§ is sufficiently disproved by DIBBLE's report from Dawfuskie Island, N. C., where, in a mild and equable climate, the command became subject to some of the most malignant of the malarial affections.

The influence of predisposing conditions in determining the type of the fever is suggested by a study of Table XXXIII, where the indicated prevalence of congestive and remittent cases in the Potomac Department seems explicable only on the assumption that the fatigues, exposures and privations of the troops operating between Washington and Richmond

* For an excellent description of the seasonal occurrence of these fevers at Sierra Leone and neighboring points on the African coast, see BOYLE on the *Diseases of Western Africa*, London, 1831.

† *On the Nature and History of the Marsh Poison.* *Trans. Royal Society*, Edinburg, 1823, Vol. IX, p. 273.

‡ FRINK—*Appendix to Part First of this Work*, p. 318.

§ *What is Malaria?* by C. F. OLDHAM, London, 1871.

rendered them more liable, when exposed to the malarial influence, to become affected with an aggravated type of the disease than men who, though exposed to more concentrated miasma, were in better condition to resist their prostrating influence.

Several of the reporters refer to impurity in the drinking water as occasioning a predisposition to malarial affections. In the early history of medical science paroxysmal fevers and enlarged spleens were referred to the action of impure water. But as the doctrine of an aërial miasm, enunciated by LANCISI, explained many things which had been obscure, it met with general acceptation, and the possibility of water-infection was forgotten by the profession although it continued as a strong belief in the minds of the uneducated in all malarious countries. This theory, however, of an air-borne swamp poison failed to account for all the cases that occurred, unless on the supposition that the evolving surface was sometimes so minute as to be readily overlooked.* Meanwhile an occasional instance was reported in which the disease was apparently due to the drinking of an infected water, as for example the well known case of the Argo.† But as malarious waters, supposing them to exist, are usually and for obvious reasons found in localities presenting all the conditions needful to the evolution of an aërial poison, the disease, when it did occur, was referred to the latter as a matter of course, while the existence of the former remained unsuspected. The recognition of water as an agent in the transmission of malarial disease has been gradually effected. Professor PARKES, giving weight to a number of cases which he mentions, accepted the theory and speculated on the connection between the disappearance of malarial fevers in England and the coincident use of purer supplies of drinking water.‡ Professor LÉON COLIN, from his experience in Algiers, denies that marshy waters produce intermittent fevers: but as the troops under his observation were operating in a notoriously malarious country the difficulties in the way of arriving at a positive conclusion must have been very great. His testimony cannot be considered as authorizing a stronger statement than the denial of the occurrence of cases which might not be plausibly referred to malarial exhalations.

A country where malaria is not exhaled from the soil, at least in quantity or concentration sufficient to produce intermittents, would seem necessary to relieve observations on malarious waters from the objection caused by the alleged presence of the aërial poison, and

* [illegible] his *Essay on Malaria*, Philadelphia, 1829, p. 28: "If it is acknowledged or proved that marsh or swamp, whether fresh or salt, [illegible] it is also a very common opinion that a certain extent of this soil, and generally a considerable one, is necessary to the production of [illegible]. These opinions [illegible] the disagreeing, as being productive of less security." He then proceeds to [illegible] infection, miasm, and contagion, arguing that the quantity of malaria necessary to produce its peculiar disease or diseases must be [illegible] known that often from a very limited spot the poison will proceed through the air or on the winds to distances [illegible] ing, notwithstanding the dilution which must take place in transit, almost as much virulence as in its native marsh; [illegible] as infected by emanations from the marshes of Erith, Northfleet and Gravesend. "The conclusion," he says, "is [illegible] ing in it which seems to admit of dispute, since it is almost a question of arithmetic. If the produce of a hundred square feet [illegible] fourteen, undergo dilution of one thousand or ten thousand times, excite disease, then must, in the inverse ratio, [illegible] th or the ten-thousandth portion of that space be capable, before dilution, of producing the same effects; or a single [illegible] (if this be the cause) may be as efficacious as an acre; supposing, of course, that it is actually applied to that part of the [illegible] its action." TOMMASI-CRUDELI holds that malaria may be generated in quantities sufficient to produce intermittent fever [illegible] flower-pots kept in bedrooms, and on the authority of Professor VON EICHWALD, instances the case of a Russian lady whose aguish [illegible] referred to this cause, were permanently cured by the removal of the flower-pots.—*Practitioner*, Vol. XXVII, pp. 387–8.

† [illegible] *Physical Hygiene* summarizes and remarks on this case as follows: "The case of the Argo, recorded by BOUDIN,—*Traité de Géographie* [illegible], 1857, t. I, p. 142,—is an extremely strong one. In 1834, 800 soldiers in good health embarked on three vessels to pass from [illegible] Marseilles. They all arrived at Marseilles the same day. In two vessels there were 680 men without a single sick man. In the [illegible] had been 120 men; thirteen died during the short passage (time not given), and of the 107 survivors no less than 98 were [illegible] of paludal fever, and as BOUDIN himself saw the men there was no doubt of the diagnosis. The crew of the Argo had not a [illegible] soldiers had been exposed to the same influences of atmosphere before embarkation. The crew and the soldiers of the Argo [illegible] the same atmospheric conditions during the voyage; the influence of air seems therefore excluded. There is no notice of the food, but [illegible] food has never been suggested. The water was, however, different—in the two healthy ships the water was [illegible] had been supplied with water from a marsh, which had a disagreeable taste and odor: the crew of the Argo had [illegible] as nearly complete as could be wished."

‡ [illegible] that the great decline of agues in England is partly due to a purer drinking water being now used? Formerly, [illegible] there was no organized supply and much fewer wells existed, the people must have taken their supply from surface [illegible]

the tendency to refer all morbid phenomena to its influence. The writer was at one time stationed in such a country, at Fort Bridger, on the northern slope of the Uintah Mountains in Wyoming Ty, where intermittents were undoubtedly imported diseases which tended to longer intervals and ultimate recovery.* Nevertheless, in this country, a remittent fever was well recognized as indigenous. It was known to the settlers as *mountain fever*, and although in most cases recovery was rapid under mercurial purges and quinine, the patient, if not subjected to specific treatment, would fall into an adynamic condition to which the name of *typhoid* or *typho malarial* was occasionally applied. That this fever was malarial in its origin was the general opinion of the medical men familiar with it, although the source of the exhalation was not evident and although, moreover, the disease did not correspond in its period of prevalence with the remittents of notoriously malarious regions. It occurred with greatest frequency during the months of May, June and July, but appeared occasionally in all the other months *except* September and October,† the months of special prevalence of the ordinary autumnal fever.

This remittent was traced by the writer to the use of the river-water constituting the supply of the post.‡ He found that this water contained a larger quantity of organic matter than was usual in good river-waters, and that the maximum and minimum of the prevalence of the fever corresponded in time with the maximum and minimum of the organic impurity in the water-supply. During the period of increased impurity the bed of the stream was more or less flooded and the water turbid from the spring rains, and especially from the melting of the snows on the mountains. As the post was seven thousand feet above the sea-level, and on the northern exposure of the mountain range, its springs were late, the thaw beginning only toward the end of April and lasting well into July. During the period of diminished impurity, as scarcely any rain fell on the mountains which at this time were free from snow, the small volume of clear water which ran in the bed of the stream must be regarded as percolated waters contributed by the mountain springs.

This led to a more extended survey of the history of mountain fever, which developed in every instance a similar relationship to organic impurity in the water. Thus hunters, miners, cattle-herders, surveying parties and soldiers on scouting duty, who made use of a surface water supply charged with vegetable impurities, were more frequently affected with remittent fever than permanent settlers who had provided themselves with a pure supply from wells and springs. That the remittents which affected these nomads were not directly due to malarial exhalations was manifest from their occurrence when the ground was covered with snow and the temperature far below the freezing point. At Camp Douglas, Utah, such remittents were observed only among soldiers who had been absent from the station on scouting duty. On account of the small size of the stream on which this post depended for its water-supply, and the possibility of its drying up at times during summer, a storage reservoir had been built. This was large enough to permit of an efficient sedimentation; but to prevent the unnecessary filling up of the basin by the intrusion of solids the instructions to the man in charge looked to the admission of water only when it ran without turbidity in the stream. The exclusion of the snow-waters and heavy rainfalls, thus effected, gave a comparatively pure spring-water at all times for the use of the post. Moreover, the gradual disappearance of these mountain remittents with the progress of

* *Hygiene of the U. S. Army.—Circular No. 8, S. G. O., 1875, p. 319.*

† See work last cited, p. 320, where a table of monthly sick rates is presented, embracing the eight years 1866–73.

‡ SMART.—*On Mountain Fever and Malarious Waters. Am. Jour. Med. Sci.*, Vol. LXXXV, 1878, pp. 1–27.

settlement was of some weight in the argument. In the early days of trans-continental travel, when the overland journey implied months of weary marching and a water-supply from rivers, ponds, dams, etc., the disease was common and dangerous; but when the journey was accomplished by steam in a few days, and the settlements furnished with a better water-supply, the remittent occurred only in those whose mode of life imposed on them the conditions common to all in the earlier days.

Soldiers on scouting duty are particularly liable to this remittent. They are exposed to climatic influences, over-fatigue, loss of sleep, anxieties, insufficient and badly cooked food and impure water. These are precisely the harmful agencies to which our troops were subjected during the civil war, except that in the latter instance there was in addition an exposure to malarial exhalations which was considered the efficient cause of all malarial manifestations. But since the troops on Indian service in Wyoming and other Territories are liable to a remittent which may not be attributed to emanations from the soil, it is possible that some of the remittents which affected our soldiers during the war may have been due to other causes than an air-borne malarial poison. And if so, this cause must have been an impure water; for the troops at Fort Bridger were also affected by the remittent, and they had nothing in common with the soldiers on scouting duty except the water-supply from the running stream, at times charged with vegetable impurities. They were well fed, well clothed and sheltered, and had no exposures nor fatigues other than those borne by their comrades at posts where there were no remittents, but where there was at the same time a better water-supply.

In view of these facts and considerations, to which may be added a few instances of probably malarious waters more recently recorded,* it seems not unlikely that a certain percentage of the malarial diseases which affected our armies was due to the introduction of the malarial poison into the system by means of the drinking-water.

The writer was, and is, inclined to believe that the cases due to water-impregnation were included among those characterized by adynamic tendencies, because remittents instead of intermittents occurred at Fort Bridger, and these, when neglected, assumed a typhoid character. It may readily be allowed, however, that where the water is strongly charged with the poison the morbid developments may be rapid and pernicious, as in the cases on

* See SMART on *Water Analysis*, in the *Annual Report of the National Board of Health*, Washington, D. C., 1880, p. 502, where sample No. 45, sent by Dr. GAINES of Mobile, on account of malarial remittents having occurred among the persons using it, was found to contain .35 part organic ammonia per million. No. 46 of the same report, from a cistern in a well-paved and non-malarious section of New Orleans, was furnished by Dr. C. B. WHITE, Medical Director of the Citizen's Auxiliary Sanitary Association, that lead, if present, might be detected, as the persons using the water had been affected with many anomalous symptoms. No lead was found, but the impurity of the water, .70 of organic ammonia, was such that the analyst believed himself dealing with swamp-water furnished for the purpose of testing his results. Pending the analysis a severe case of remittent fever was developed in the house in the person of a woman who had not been in a malarious neighborhood for many months. Suspicion was aroused in the minds of the people and the cistern was closed. When the analyst reported the water as a veritable swamp-water, the occurrence of this fever was made known to him. According to the *Report of the National Board of Health*, 1882, p. 293, Dr. E. D. COONLEY, of Mariner's Harbor, Staten Island, N. Y., was called on a Wednesday to see the case of a girl six years of age who died after a convulsive seizure which had been preceded by twenty-four hours of chill, headache and vomiting. No autopsy was held. On the following Sunday another child of the same family had a chill followed by febrile excitement. The chill recurred next day, and death took place after delirium and convulsions. As the remaining children, three in number, were now showing symptoms of congestive fever, Dr. COONEY ordered the family to move into another house about thirty rods distant and situated upon higher ground. The ground on which the vacated house stood was so low that occasionally it was surrounded by the tide. The well was only about six feet deep, and about a month before the death of the first child it was completely filled by a very high tide. This was baled out, and afterwards, when the water came into the well, a green scum was noticed on the surface of it. The door-yard was kept in a filthy condition. This was the only water used from the time the well was baled out until the second child died; and the mother stated that these two children drank a good deal of the water. The remaining children promptly began to recover under specific treatment and were fully restored to health. Dr. COONLEY referred the cases to the use of the well-water. The analyst's report on this sample, the history of which was unknown to him, may be summed up in the remarks appended to the analytical details—"bad, probably ditch-water." See also the *British Medical Journal*, November 8, 1884, to which Mr. WHALLEY, a member of the Indian Civil Service, contributed, p. 942, an interesting memorandum concerning the propagation of malarial fevers by impure drinking-water. Along the base of the Himalayas, in the northwestern provinces of India, lies a belt of marsh and forest called the Terrai, which for many years has been uninhabitable owing to the malarial fevers which prevail there. Continuous efforts have been made by the government of the provinces to reclaim and populate this tract, but with only partial success. The strife between enterprise and malaria is continually carried on, but at the cost of a fearful sacrifice of human life. The people have for ages believed in the transmission of the fever by means of the drinking-water, and this belief, it is stated, has at last been accepted in its

the Argo and in those recorded by Dr. COONLEY.* The occurrence of hæmaturic fever in the winter months is suggestive of a water origin,† as are also the congestive chills which occur in some instances without an apparently adequate exposure to concentrated miasms. These cases may not be all referred to differences in the physiological condition of the individual, due to variations in nutrition or hygienic surroundings, since differences in the type of the disease are manifestly less dependent on such idiosyncratic conditions than on season and locality, and, as in the case of the mountain fever, on the nature of the poison or on its mode of introduction into the system.

The agency of the water-supply in the transmission of the malarial poison has an important practical bearing. A water free from vegetable organic matter is indicated as a means of prevention. But, in addition, a study of the data collected concerning the effects of impure water shows that while surface waters have malarial possibilities, filtered or percolated waters have not been suspected of causing paroxysmal fevers.‡ Filtration appears to remove the malarial poison. The conditions of active field service do not always admit of well-digging or systematic artificial filtration, and hence the occasions are of frequent occurrence when an extemporized filtration by the regiment, company or individual would probably prevent much sickness, disability and death.

Although the connection between vegetable matter in a water and a possible malarial character of the latter has been established, there is no ground for assuming that the vegetable impurity is the cause of these remittents. Infusions of putrescent vegetable substances have been taken into the stomach without the production of malarial symptoms.§ But as malaria is generated in soils rich in vegetable matter, a water contaminated by the one will be likely to be charged with the other, whether that water is stagnant on the surface of the malarious soil or an air-cleansing precipitation on a non-malarious region. It is not difficult to understand the absorption of malaria by moisture in swamps, marshes and other localities where exist the conditions recognized as needful to the generation of the poison. It seems probable, however, that the processes of nature result in a general

entirety, though hesitatingly, by most of the medical profession in India. The illustrations given by Mr. WHATLEY are convincing: "A party of workmen were sent two or three years ago, in the month of October, to repair a bridge over a stream called the Chūkā, and they were dependent on the stream for their drinking-water. Out of the thirty men only three escaped fever, and several died. Since then a deep masonry well has been constructed at a few hundred yards distance from the bridge; and the forest guards, who are located there and drink only the water of the well, find the station as healthy as any other. Again, a village named Bahrwa, two or three miles from the forest border, where the supply of drinking-water was obtained from shallow wells fed by the infiltration of the surface drainage, had been repeatedly settled and deserted, owing to the fatal character of the fever which prevailed there. Six years ago the landlord went to the expense of constructing a masonry well forty feet deep, reaching down to the spring level, and closed all the shallow wells previously used. Since then the village has become known as one of the healthiest villages in the neighborhood. The Forest Department now constructs deep masonry-wells at all the forest stations, and by this precaution is enabled to maintain a permanent staff of guards at stations where formerly the men were invalided and had to be relieved every fortnight. Moreover, the villagers in the vicinity show their appreciation of the measure by resorting to these wells for their supply of drinking-water during the malarious season. There seems therefore to be little doubt that in this tract the chief cause of malarious fever is the drinking-water, which has been exposed to some poisonous action above ground. The streams which enjoy the most deadly reputation all take their rise in the dense forest, and are overhung for a portion of their course by a thick screen of overarching trees and bushes. Streams which are bordered by sand or boulders are generally innocuous. Unhealthy villages are found mostly along the shallow depressions which convey the surface-water of the forests to the rivers. Both facts seem to point to the conclusion that the malaria contained in the water is generated by the decaying vegetation; and the fact that the malarious season begins in April and becomes most deadly in October, which has been used to establish another theory, does not militate against this, for these periods are coincident with the periods when the forest trees shed their leaves. But, however this may be, there is no question that many places noted for malaria have now become healthy, and the change has been sharply marked, and contemporaneous with the construction of masonry-wells." Surgeon E. G. RUSSELL, Bengal Medical Service,—*Malaria and Injuries of the Spleen*, Calcutta, 1880,—also gives from his experience in India many instances of the association of malarial diseases with the use of water draining from jungles, terrais or marshes at the base of mountain ranges, and their disappearance on the substitution of a better water-supply.

*See last note.

†See note *supra*, p. 126.

‡ The purer supply which in all countries has succeeded the use of impure surface collections, and which has coincided with the diminished prevalence of malarial disease, has been in the first instance derived from wells or springs. The water of these has often been convicted on more or less positive evidence of the propagation of typhoid fever; but in no case has a well-water been arraigned for the causation of malarial disease unless there has been an evident inflow of surface washings. In Professor MALLET'S investigation into the value of the processes of water analysis—*Annual Report of the National Board of Health*, Washington, 1882—nineteen natural waters were reported, in each of which there seemed fair ground for believing that disease had actually been caused in the persons of those drinking them; but of these Dr. COONLEY'S case, noted above, is the only instance of a well-water suspected of malarial infection, and in it a surface inflow was clearly established.

§See experiments of PARENT-DUCHATELET and ANDRAL, noted in the Second Part of this work, p. 610.

diffusion of malaria in the surface waters of the earth. If malarial exhalations be not destroyed by atmospheric agencies they must accumulate as a part of the heterogeneous materials which would collect to a suffocating turbidity in the aërial ocean but for their precipitation from time to time with the rain and snow. The fogs or mists which gather over marshes are known to be specially pernicious from the condensation or concentration of evolved malaria accompanying the fine precipitation of the atmospheric moisture. It is but a step further to assume its condensation and precipitation with the rainfall and snow.*

*Dr. WOODWARD, in a note on p. 610 of the Second Part of this work, says that he will have occasion hereafter, when discussing the etiology of malarial fevers, to refer to the arguments brought forward by Dr. SMART in favor of the probable presence of malaria in the snow. There is thus presented to the writer the delicate task of criticising his own work and opinions from Dr. WOODWARD'S point of view. Fortunately his article on *Mountain Fever and Malarious Waters*, *Am. Jour. Med. Science*, Jan., 1878, was submitted while in manuscript to Dr. WOODWARD, who, in a letter to Assistant Surgeon General C. H. CRANE, U. S. A., dated May 1, 1877, entered his objections to the theory: 1st. "Let me point out," he says, "that if Dr. SMART'S analyses are correct, the snow that falls at Camp Douglas contains as much organic ammonia as WANKLYN, whose process he employs, found in the Thames at London Bridge, and more than he found in some of the worst London drinking-water. I confess it easier for me to believe that Dr. SMART has fallen into some error in his manipulations than to believe this. The process is acknowledged to be one of extreme delicacy, in which it is easy for an inexperienced manipulator to fall into error, so that I cannot help suspecting the extraordinary results obtained." Dr. WOODWARD'S want of faith in the accuracy of the analytical results prevented him from giving the subject that consideration which it would otherwise have received from him; thus only may we account for the hasty and superficial views on which his further objections were based. 2d. "Nor am I better satisfied with the hypothesis by which Dr. SMART accounts for the presence of so much organic matter in the air of the Rocky Mountain region. The prevailing winds of the continent are from the west to the east, the great majority of the storms move in that direction, and they ought to carry the organic matter blown with the air from the surface of the continent *away* from the Rocky Mountains instead of towards them. 3d. Moreover, if Dr. SMART'S hypothesis is correct, the *vernal* intermittents in the Rocky Mountain region ought to predominate in number and severity over the autumnal ones. So far as I know, however, the reverse is the case. The statistics of the Pacific region, including the stations in New Mexico, Colorado and the slope between the Rocky Mountains and the Pacific Ocean, show malarial diseases to be as distinctly autumnal as in the other regions. 4th. Even Dr. SMART'S post of Camp Douglas is no exception to this rule. The annual number of cases of intermittent and remittent fever occurring at it is usually very small, but in 1866–'69, '71, '72–'73 and '74 there were a good many cases. Those of 1869 were all imported from Florida; the others originated on the spot, and give a distinctly autumnal curve in every year except 1874, in which the vernal fevers predominated. 5th. As to mountain fever, I have never seen a case, and know it only from the testimony of others. From what I have thus learned I am obliged to conclude that Dr. SMART'S observations refer to certain mild *vernal* epidemics, and are hence partial and incomplete. The more severe epidemic observed by Dr. VOLLUM in 1871 at Camp Douglas was an autumnal one, and as his account of it is interesting and differs in many respects from that of Dr. SMART, I submit a copy of the remarks on his sick report for September, 1871. * * * 'During this month an epidemic of intermittent and remittent fever accompanied by diarrhœa, dysentery and tonsillitis has prevailed at this place and in the neighboring settlements. The officers' and soldiers' families were chiefly affected, but the severest cases occurred among the troops. The number of cases among the families was, intermittents 23, typhoid fever 4. Among the women and children symptoms resembling hysteria often appeared and tended much to disguise the cases. In many of these cases there was a strong tendency to sink into a typhoid condition; and the typhoid cases reported among the troops commenced as intermittent. Among the officers' and soldiers' families there were four cases of typhoid fever that commenced in the same way. This epidemic is styled by the resident physicians as the mountain fever, the tendency of which seems to be to pass on from the symptoms of a simple intermittent to those of true typhoid fever. Its habits in the intermittent or remittent stage are similar to malarial fever elsewhere in the United States, and it is controlled by quinine if pushed in ten-grain doses three times a day for a week or ten days. I have a belief that if this treatment, accompanied by good nourishment and moderate stimulation, were adopted early enough, the typhoid symptoms would be prevented and the case kept within the bounds of intermittent or remittent fever.'"

In reply to these arguments the writer submits:—1st, That an experience of many years in the processes of water analysis, including numerous examinations of rain-water and snow-falls in various parts of the country, warrants a belief in the substantive existence of the vegetable matter reported by him in the river, rain and snow-waters of Fort Bridger, Wyoming Territory, and Camp Douglas, Utah Territory. 2d. That the prevailing winds are from the west to the east is acknowledged; but this cannot be considered as proof that the rain and snow-falls in the Rocky Mountains are especially free from organic matter, when they are known by direct experiment to contain an unusually large quantity. There are currents and counter-currents in the air, as in the ocean, and we cannot predicate what may be going on in the higher strata of the aërial ocean from the direction of the currents at its bottom. 3d. There are many malarious valleys in the Rocky Mountain region and in the vast section of country known as the Military Division of the Pacific, where intermittents are produced by exhalation as in other swampy districts; and as these predominate so greatly over the mountain fever cases, malarial diseases in the Pacific region may be expected to be as distinctly autumnal as they are in the Mississippi Valley. There is, indeed, no general season for mountain fever. Its appearance in a given locality is due to local conditions. At Fort Bridger it is vernal in its visitations, since that is the season during which the stream is specially contaminated. On account of the high elevation and northern exposure the immense masses of snow which choke up the mountain gorges during the winter take a long time to melt and drain off, during which period the river is swollen to two or three times its average size and its waters are discolored and turbid. At Camp Douglas, however, the conditions are wholly different. The stream is small, it being one of a dozen which run a short course down the mountain side to a main stream, the Jordan river; the exposure is southern, the altitude lower, and the winter climate much less severe than on the mountains above Fort Bridger, so that snow does not accumulate, but falls, melts and is carried off several times during the course of the season, from November to May, rendering the stream swollen and turbid for a week or two at a time; and so, during the summer and autumn, a thunder-cloud creeping along the mountain range will flood the creek for a day or two, or if the mountain showers are repeated at short intervals, for a week or two, thus disseminating the probable cause of mountain fever all over the spring, summer and autumn, if the turbid and impure waters are used as a drinking-supply. Hence the time of visitation at Fort Bridger may not be the time of visitation at another station. The time corresponds with the flooding of the stream with snow and rain-water, and not with any special month or season of the year. Nor can this time be ascertained from the record of the rainfall at a post, as it is the fall on the radicles of the stream which is in question: the stream at Camp Douglas, for instance, is not unfrequently turbid from mountain showers while the post and its vicinity are dusty and parched for lack of rain. 4th. The annual number of cases of malarial disease occurring at Camp Douglas is usually very small, but in certain years there were a good many. In 1869 the intermittents were imported from Florida, and in the other years characterized by their presence there were very notable changes in the constitution of the garrison. The statement that the cases which occurred in these years originated on the spot is not sustained by a close inspection of the history of the post. Some of them originated, to the knowledge of the writer, while the men were absent on Indian service. From the impossibility of distinguishing in many instances the imported from the indigenous malarious cases among those which appear on the records of former years, it cannot be determined that the latter are vernal or autumnal, nor which is of more importance, that they do or do not correspond with the impure condition of the water-supply. 5th. Dr. VOLLUM attributed his cases in 1871 to rotting wood in the old barrack quarters, and to dampness and want of ventilation and sunshine, factors which certainly do not enter into the causation of many undoubted cases of mountain fever. An improvement in the health of the garrison was coincident with the construction of the water-reservoir; but as at the same time new and commodious quarters were built, the writer did not admit this increased healthfulness of the post into his original argument in favor of the transmission of malaria by the water-supply. Inasmuch,

Malaria is not an unstable organic gas, for were it so its dissipation in the air would be followed by its destruction, and its subsequent condensation in the marsh mists would be impossible. It has therefore a certain stability, and its presence in the rain may be as readily accepted as its presence in the mists, if the same morbid phenomena follow the ingestion of the rain-water as follow an exposure to the mists. This stability, in view of the oxidizing influences of the air, is suggestive of a vital resistance on the part of the miasm, and lends countenance to the views of those who regard as the essential of malarial disease a specific germ, which will be eventually, if it has not been already, identified.*

Relapses.—In some instances in which the individual had already suffered from the disease the so called predisposing causes operated so strongly as to be apparently the determining cause of a relapse or recurrence. It was observed, in commands affected by the malarial poison, that a suddenly developed increase in the number of the intermittent cases frequently resulted from exposure to chill, as from wet clothes, weather changes or incau-

however, as Dr. Woodward has brought the epidemic forward in this connection, it may be pointed out that while the local conditions mentioned by Dr. Vollum may, and undoubtedly had their influence on the character and progress of the disease, they were not the essential, for he expressly states that the epidemic was not confined to the post, but implicated the neighboring settlements, all of which, it may be remarked, made use of water from the Camp Douglas stream or from others running a parallel course and subject to the same contaminating influences.

*The latest attempts at identification have been by Klebs and Tommasi-Crudeli—*Studi sulla Natura della Malaria.* Roma, 1879. These estinvigators announced the discovery of a bacillus which they found constantly present in the swamp-mud of the Roman marshes. This bacillus was susceptible of cultivation in fish-gelatine, and when injected into rabbits produced a fever similar to that which occurs in the human subject when exposed to paludal exhalations. It consisted of short rods 5 to 10 micromillimetres in length which evolved into tortuous filaments, jointed by the formation of clear spaces at regular intervals in their protoplasm; spores were developed in the centre or at the extremities of the joints. They considered this microphyte as the cause of malarial fever, and named it B. malariæ. But other observers have failed to identify it. Sternberg, who was sent by the National Board of Health to investigate this subject in the malarious environs of New Orleans, found in the marsh-mud, among many other bacterial forms, some which seemed to answer the description given of the B. malariæ, but similar forms were found in dust from the city squares of New Orleans, and also in culture experiments at Baltimore, where malaria was not in question. Moreover, the inoculation experiments on rabbits were held by him to be inconclusive, as the temperature curve in the rabbits operated on had in no case a distinctly paroxysmal character, while healthy rabbits sometimes showed as marked variations in temperature as those delineated in the charts of Klebs and Tommasi-Crudeli. The changes in the spleen which these experimenters found at the autopsy of the inoculated rabbits, and attributed to the malarial influence, were shown by Sternberg to occur in death from septicæmia produced by the inoculation of human saliva—see *Supplement No.* 14, *National Board of Health Bulletin*, Washington, 1881. We must therefore conclude with him that the evidence on which Klebs and Tommasi-Crudeli based their claim to a discovery is not satisfactory. Nevertheless Dr. Julius Dreschfield, Pres. Microscopical Section, Manchester Medical Society, exhibited at one of the meetings of the section specimens of blood taken from a sailor suffering from intermitting attacks of fever. The blood contained bacilli of exactly the same character as those described by Tommasi-Crudeli. During the intermissions the bacilli disappeared, but their spores could be readily distinguished.—*British Med. Jour.*, Vol. 1, 1884, p. 462. While Lanzi and Terrigi (see note *supra*, p. 152) regard the pigment granules in the blood of malarial cases as resulting from a fermentative action produced by similar granules derived from the decomposition of an *Alga miasmatica*, Laveran—*Nature Parasitaire des Accidents de l'Impaludisme*, Paris, 1881—insists that these pigment granules are connected with the life-history of a microparasite which flourishes in the blood and which has heretofore been regarded by Kelsch and others as a pigment-bearing leucocyte. In examinations of the blood in sixty malarial cases during his service in Algiers Laveran found the pigment granules in forty-two cases. The large proportion of negative results was due to prolonged treatment in these instances by the sulphate of quinine. But the interest in his observations attaches to the cellular envelope enclosing the pigment granules. It was distinguished under three forms, which he has figured. In the first the cells are elongated, somewhat pointed at their ends and often incurved (banana-shaped); sometimes, however, they are oval; the pigment grains are loosely aggregated or disposed in an annular form toward the centre of the cell. In the second the cells are spherical, and in size sometimes even larger than a red blood-corpuscle; the pigment grains are usually arranged in a ring concentric with the circumference of the cells. These spherical bodies are furnished with three or four slender filaments each about three times as long as the diameter of a red blood-corpuscle. When in rapid motion the filaments undulate like the anguillula and their action impresses a movement on the neighboring corpuscles. In the third form there are various deviations from the spherical outline; the cells are larger than those of the filamented series, and while the contained pigment grains are irregularly disposed the annular arrangement is sometimes noticed. Laveran regards these three kinds of cells as representing different phases of the evolution of the same parasite, the second form furnished with mobile filaments being considered the perfect state of the organism, while the third form is regarded as the cadavers of the parasitic elements and as identical with the pigmented elements found in the organs of persons who have died of pernicious fevers. Recently Tommasi-Crudeli, Marchiafava and Celli—*Indian Medical Gazette*, Vol. XXI, p. 7, Calcutta, January, 1886—have shown that the appearances regarded by Laveran as due to an exotic organism in the blood are in reality the result of degenerative changes in the red blood-corpuscles. The globular protoplasm appears to become absorbed or converted into a hyaline material showing amœboid changes of form, and the hæmoglobin is transformed into melanotic particles which exhibit oscillatory movements in the interior of the corpuscle now represented by a diaphanous spherule. The mobile filaments of Laveran have been observed by these investigators, but are believed to consist of globular protoplasm modified in a way as yet unknown. The corpuscles ultimately become disintegrated and the black particles in various degrees of aggregation are set free in the current of the circulation. Camillo Golgi—*Fortschritte der Medicin*, B. IV, 1886—has also seen changes in the blood similar to those described, consisting of the development of colorless plasmic bodies in the red blood-corpuscles. As these bodies enlarge melanotic particles are found scattered within their substance. All trace of the normal constitution of the blood-corpuscle becomes lost in its transformation into a colorless globule containing particles of pigment. The latter ultimately tend to the centre of the globule, appearing as a dark nucleus around which the colorless substance undergoes fission in radiating lines, the resulting cellules presenting a semblance to the rays of a composite flower. When this stage of development has been reached a febrile attack is imminent. Afterward the cellules and the central mass of pigmented matter are liberated into the current of the blood. At Pavia, Golgi examined forty cases with negative results in two only. Most of his fevers were quartans; and he claims that the long intervals between the paroxysms afforded time for the complete development and fission of the altered corpuscles, results which are not observed in fevers which have shorter intervals. Whether the destruction of the red blood-corpuscles and the associated pigmentary changes result from the action of the bacillus malariæ or of the alga of Lanzi and Terrigi, or are independent of both, does not appear to have been determined; but Tommasi-Crudeli regards them as of great practical importance in the diagnosis of obscure cases of malarial infection in continued and subcontinued fevers.

As the germ theory of malarial disease explains so many of the morbid phenomena and is at the same time consistent with what is known of the natural history of the disease-essence, there is a strong tendency to accept it in advance of the isolation and identification of the specific micro-organism,

tious cooling after the perspirations of fatigue duty. That these attacks were not due to fresh accessions of the poison was evidenced by their occurrence after the temporary chill of a bath undertaken as a luxury or in the interest of personal cleanliness. Relapses were also oftentimes referred to errors of diet. They occurred at any time after the primary attack; but in cases in which the operation of a predisposing cause was not manifest a tendency to recurrence at weekly intervals was generally conceded: thus MERRITT speaks of warding off the hebdomadal chill by arsenite of potash.* No observations were recorded on this point; nor were they possible on an extended scale, as treatment interfered with the natural progress of the morbid phenomena.†

VI.—PREVENTION OF MALARIAL DISEASE.

GENERAL CONSIDERATIONS.—From what has been said under the head of causation, it is clear that the protection of the troops from the malarial influence is the all important preventive measure. It is true that on active service the imperative military necessity often requires the sacrifice of life by disease in the occupation of an important but unhealthy locality, as it calls for exposure to death on the line of battle; but in both instances a thorough knowledge of the ground may permit it to be held with a minimum of loss. Dr. WOODHULL shows that the disease in the 9th N. J. Vols. was due to the occupation of a camp near a broken dam presenting a large extent of bottom land as a malarial exhalent. The 6th Conn. Vols., in DIBBLE's report, became seriously damaged by its camp in the swamps of Warsaw Island. These and various other reported instances may have been unavoidable results of the military necessity; but it is certain that the health of many commands suffered from the occupation of unhealthy camp-sites which were afterwards abandoned although the military conditions remained unchanged. Thus we find Dr. TRIPLER effecting

* See MERRITT's report, *infra*, p. 180.

† FORRY in his *Climate of the United States*, New York, 1842, p. 283, says: "That intermittent fever has a tendency to a septenary revolution is a fact that was frequently verified in Florida under the author's observation; and this too in a manner so unequivocal that it attracted the attention of the common soldier. At these septenary periods, after the seventh, fourteenth or twenty-first paroxysm, the disease has a disposition to terminate spontaneously. It is at these periods that febrifuge remedies act with the greatest success; and as regards relapses, it is then too that a vast majority occur, a circumstance of such frequent occurrence in Florida that soldiers would voluntarily come to the hospital to obtain medicine to prevent its return." These statements are somewhat paradoxical: The influences operating at the septenary periods not only cause the subsidence of an attack in one who is suffering, but have power to determine the occurrence of an attack or relapse in one who is not suffering. The doctrine of a periodicity dependent on [illegible] being entertained by able observers, especially in India. Dr. FRANCIS BALFOUR in his *Treatise on Paroxysmal Remitting Intestinal Fevers*, Edinburgh, 1859, developed the theory of sol-lunar influence. In accordance with his views daily remissions and aggravations, septenary returns and [illegible] are due to the combined influence of the sun and moon, the febrile state being greater at the diurnal meridional periods than during the intermeridional intervals; at the novi-lunar and pleni-lunar periods than during the intervening periods, and especially at the lunar periods of the equinoxes as compared with those of the inter-equinoctial intervals. He states that the sol-lunar influence in fever is felt at Bonaris and other places not less than three hundred miles distant from the reach of the tides, and that consequently LIND's idea that these, and not the agencies by which they are caused, are connected with the progress of fever is sufficiently refuted. Sir J. R. MARTIN in his *Influence of Tropical Climates*, London, 1861, quotes the observations by which Mr. FRANCIS DALY, of the Madras army, arrived at the conclusion that there is a sol-lunar influence as argued by Dr. BALFOUR; and W. MOORE in his *Diseases of India*, London, 1861, pp. 87–8, says: "Indeed a very short practice in the tropics will convince the most sceptical that individuals who have suffered from malarious fevers are more or less affected at either the full or change of the moon. Many experience relapses at these times; others, feelings of uneasiness or malaise, but not amounting to actual ague; and this predisposition to become periodically affected may remain for months and even years, and may recur at uncertain periods, the intervals being passed in perfect health. That the moon *per se* has any effect in inducing this state may well be questioned; but that the amount of mud surface exposed by the low ebb-tides and the consequent great [illegible] taking place may act as an excitant, is at least probable in the neighborhood of the sea-coast. In far inland districts some other solution of the mystery is, however, requisite; and MOREHEAD inclines to the opinion that when the coincidence of febrile disease and lunar phases is noted, there will generally be found present an appreciable atmospheric change of temperature, of moisture or of direction of winds, which he apprehends is the [illegible] cause of the febrile disturbance." Nevertheless, in the *Annals of Military and Naval Surgery, &c.*, London, 1863, Dr. H. GIRAUD, on page 184, states that the want of reliable evidence on the subject of the moon's influence on periodic fever having been brought to the knowledge of the commander-in-chief, [illegible] officers were issued requiring that the records of paroxysms should be kept in every medical charge in the Bombay Presidency during the year 1861, with a view to examine the question. The result showed 56,175 paroxysms as occurring in 146 medical charges at 44 stations, and it is concluded from these that paroxysms of fever do not occur more frequently at the springs than at other periods of the month.

the removal of the troops from the flats near Arlington, Va., to the higher grounds beyond the first ridge overlooking the Potomac river, that they might have the protection of its crest from the malarious currents uprising from the bottom lands.*

The predisposing conditions or so-called causes were also unavoidable in many instances, but not in all. Exposures to excessive heat, cold, rain, fatigue, etc., might not be avoided in the face of the enemy, but their influence was at times unnecessarily felt in camp. At one period the men of the Army of the Potomac were turned out for duty long before sunrise and breakfast, but Dr. TRIPLER, recognizing that this had much to do with the prevalence of malarial fevers, obtained an order that reveille should not be sounded until after sunrise, and that hot coffee should be issued immediately after roll-call.

A dry camp-site, good water and food, suitable clothing, the avoidance of unnecessary drills and fatigues during hot weather, and of exposure to nocturnal chills, particularly when the troops are fasting, will not only lessen the prevalence of malarial diseases in commands which have unfortunately been exposed to the miasmatic influence, but when combined with temperance, cleanliness and that regularity of life which old and well disciplined soldiers find to be not inconsistent with active service in the field, will probably, as suggested by Ass't Surg. INGRAM, prevent the development of typhoid symptoms in the manifestations which do occur.

The experience of our medical officers is opposed to the idea of an accommodation of the system to the malarial poison with the concurrent retention of a normal degree of health. The febrile accessions might fail to recur, but the patients continued anæmic, weak and languid, if they did not become subject to the more active manifestations of chronic malarial poisoning, so long as they remained exposed in the malarious country. Medical Inspector W. H. MUSSEY, U. S. A., touches this subject in a report of an inspection of the Department of North Carolina, dated April 13, 1863:

Much has been said upon the subject of acclimation, which, in these localities, would be nothing more nor less than a complete saturation of the system with malaria, so that intermittent fever would be the normal condition of those acclimated. But there must be acclimation to the new life of the camp, and this is important. It is essential to keep the soldier up to the highest point of resistance to the malarial influences. Care in the quality of the food, the proper mixture of vegetables, the cookery, the administration of prophylactics, attention to cleanliness, raising the bed above the ground, avoiding unnecessary exposure in the night, wearing flannel, and the administration of coffee and a lunch, are the best means of securing this resistance.

PROPHYLACTIC USE OF QUININE.—The attention of the medical officers of our armies was directed to the prophylactic use of quinine at the very outset of the war. In the *Rules for preserving the health of the soldier*, prepared by Dr. WM. H. VAN BUREN of New York, for the United States Sanitary Commission, and issued July 13, 1861,† the daily use of quinine was recommended in localities where ague and fevers were prevalent. Later in the year a pamphlet by the same author‡ was also issued giving a digest of the evidence on which the recommendation was founded.

This embraced the personal experience of the author in Florida during April, 1840, that of his friend Dr. J. S. Newberry on the Isthmus of Panama and elsewhere, a letter from President David Hoadley of the Panama railroad company, setting forth the beneficial results of an issue of quinine in wine to the crews of merchant vessels visiting Aspinwall, a letter from William Laird of Liverpool, relating the successful use of quinine as a prophylactic by the

* Appendix to Part First of this work, p. 46.

† U. S. Sanitary Commission Doc. No. 17, reprinted in *Military Med. and Surg. Essays*, edited for the Commission by WM. A. HAMMOND, Philadelphia, 1864, par. 25, p. 168: "It is wise and prudent, when ague and fevers are prevalent, that every man should take a dose of quinine bitters at least once in twenty-four hours. This will surely serve as a safeguard against an attack of disease; it has been practised in Florida and elsewhere with undoubted benefit."

‡ WILLIAM H. VAN BUREN—*Quinine as a Prophylactic against Malarious disease*, Sanitary Commission Doc. 31, New York, 1861, reprinted *op. cit.*, last note, p. 93 *et seq.* From a note appended to the original pamphlet it appears that this essay was approved for publication September 30, 1861.

crews of a line of steamers plying between Liverpool and the coast of Africa, the testimony of Bryson* and Hayne† of the English Navy, De Saussure‡ of Charleston, S. C., and of several African travellers,§ besides sundry favorable opinions and recommendations from various sources showing the confidence with which the measure was regarded in various quarters.‖

It was declared to be a fact well established in the experience of American physicians, that the daily use of three to six grains of quinine by those who are exposed to the danger of malarial poisoning will in most instances avert an attack, or failing this, will render the disease milder and prevent the development of the malarial cachexia.

In accordance with these recommendations quinine dissolved in whiskey was frequently used as a prophylactic by our medical officers, but no systematic records of the results were kept; nor does it appear that the method was anywhere employed with persistence on a considerable scale. The difficulty of transporting the whiskey needed for the purpose often interfered with the continuance of the experiment, and at other times the quinia itself could not be obtained in sufficient quantity. Many medical officers were led by their observations to form a favorable opinion of the efficacy of this prophylactic method, and in the Sanitary Commission's Memoirs may be found the testimony of Surgeons Isaac F. Galloupe, S. B. Thrall, F. H. Milligan, S. W. Abbott, W. S. Willes, H. Z. Gill and Professor Paul F. Eve.¶ Moreover, Dr. Flint expressly states that no testi-

* Alexander Bryson—*On the Prophylactic influence of Quinine. Med. Times and Gaz.*, 1854, Vol. I, p. 6—refers to a standing rule in the Navy enjoined by the 9th article of the Surgeons' Instructions, that men sent on shore in tropical climates should take daily in the morning a drachm of powdered bark in wine as a prophylactic, and states that this measure had fallen into disuse partly on account of the doubts of the medical officers and partly because of the nauseous character of the dose. He then speaks favorably of the use of amorphous quinine in wine, citing the reports of a number of medical officers on the African station to the effect that boats' crews using this prophylactic either wholly escaped or had milder attacks. He admits the occasional failure of quinine-wine as a preventive of fever, but holds that it has been of most essential service. He had previously recommended its use, and given some evidence in its favor in his *Report on the Climate and Principal Diseases of the African station.* London, 1847, p. 218.

† L. J. Hayne—*On the Endemic fevers of Africa and the Prophylactic use of Quinine. Med. Times and Gaz.*, 1855, Vol. I, p. 280—cites the case of a boat's crew exposed on the Ponga river for two days and nights: 32 officers and men who used the prophylactic daily had but four slight cases of fever. As a contrast to this he instances the exposure for seven or eight days on the Lagoon at Lagos of 34 officers and men who only took the quinine every other day, and had seventeen severe cases; while an officer and man on shore at Sierra Leone for eight days took no quinine, and both had remittent fever. But it will be observed that the men who suffered least had been exposed the shortest time, and that the localities were not the same.

‡ H. W. De Saussure—*Quinine as a Prophylactic of Intermittent and Remittent fevers. Charleston Med. Jour. and Review*, Vol. XV, 1860, p. 423—testifies to the success of this measure on the rice plantations and elsewhere in South Carolina, citing the English naval experience, and contrasting the fatality of remittent fever in the first Niger exploring expedition with the comparative good health of the second expedition, in which quinine was used as a prophylactic. An account of the first has been given by J. O. McWilliam—*Med. Hist. of the Expedition to the Niger during the years* 1841-2, *comprising an account of the fever which led to its abrupt termination.* London, 1843. The second has been chronicled by William Balfour Baikie—*Narrative of an Exploring voyage up the rivers Kwo'ra and Bi'nue (commonly known as the Niger and Tsâdda) in* 1854. London, 1856. See *Appendix G*, p. 452, and also an article by the same author—*On Remittent fever, especially as it appears on the West coast of Africa, etc. Edinburgh Med. Jour.*, Vol. II, 1856-7, p. 803.

§ Such as W. B. Baikie, see last note. T. J. Hutchinson—*Impressions of Western Africa*, London, 1858, p. 229. The article on *Intermittent fever* in the *Encyclopædia Britannica*, and Du Chaillu—*Equatorial Africa*, Chap. XVIII, p. 369—to which the editor has added a reference to the observations of Mouat among the Andaman Islands—*Annals of Military and Naval Surgery and Tropical Medicine, etc.*, London, 1864, p. 193.

‖ He cites George B. Wood—*A Treatise on Therapeutics, etc.*, Philadelphia, 1856, Vol. I, p. 260; and also the recommendations of several English army medical officers of high position and reputation, whose views, however, do not appear to have been carried far enough to yield definite practical results. The first of these is the letter of Director-General A. Smith of the Army Medical Department, July 27, 1855, to the Inspector General of Hospitals in the Crimea, recommending the prophylactic use of quinia, and remarking: "Having now at command sufficient of this drug, specially provided for that service, to furnish five grains per diem to every member of a force of 35,000 men, I beg you will take such measures as you think proper with a view to induce the medical officers to employ that remedy."—*Report of the Commissioners appointed to inquire into the Regulations affecting the Sanitary condition of the Army*, etc., London, 1858, Appendix 79, p. 70. *The Med. and Surg. History of the British Army which served in Turkey and the Crimea*, etc., London, 1858, makes no mention of the adoption of this measure; but in the appendix to Vol. I, p. 504, Sir John Hall, Inspector General of Hospitals, in reply to one of the queries of the Director General, wrote in January, 1857, that "In malarious districts, quinine, or quinoidine in solution, which is preferable from the form it is in, given as a prophylactic in either wine or spirit, is very beneficial, but soldiers do not like it, and I have heard them declare that it had occasioned the complaints they were laboring under at the time." The second is the recommendation of Director-General J. B. Gibson of the Army Medical Department, submitted to the Minister of State for War during the preparation for hostilities in China in 1859, that a stock of quinine-wine be provided for issue during the unhealthy months, or when the soldiers are required to proceed up rivers or to encamp in the vicinity of marshy ground,—with the instructions to use quinine-wine contained in § 8 of the New Medical Regulations for Field Service issued to the Expeditionary Army (in China) during the same year.—*Army Med. Department, Statistical, Sanitary and Medical Reports for the year* 1859, London, 1861, p. 181. But in the volume of the same reports for 1860, London, 1862, p. 393, is found an official statement of the *Practical results bearing on the Medical Department* deducible from the operations in China, from which we learn: "That the experiment of quinine as a prophylactic against malaria was not tried in this campaign on a sufficiently extended scale to warrant reliable results." It is true that Wm. R. E. Smart—*Obs. on the Climatology, Topography and Diseases of Hong-Kong and the Canton river station*, Trans. Epidem. Soc., London, Vol. I, 1860-1, p. 231—speaks of the "comparative exemption" secured by quinine for the crews of the gunboat flotilla on the Canton river, but he gives nothing more precise than the statement that "they seemed not to suffer disproportionally from malarious fevers, excepting those of the intermittent type." It would appear, too, from his remarks that the quinia was given "on the slightest occasions of indisposition" rather than to the well men. The last of these citations is a mere suggestion for the use of this measure by H. C. Reade—*Remarks on the Topography of the Military stations in British Guiana, etc.*, Volume for 1859, cited *supra*, p. 243.

¶ *Sanitary Memoirs of the War of the Rebellion, collected and published by the U. S. Sanitary Commission. Medical*,—edited by Austin Flint, New York, 1867, p. 134. See also an article headed *Quinine as a Preventive of Malarial disease. San. Com. Bulletin*, Vol. I, 1864, p. 215; also *Amer. Med. Times*, Vol. VIII, 1864, p. 248, in which the inspector of the Sanitary Commission in the Department of North Carolina and Virginia, J. W. Page, reports great benefit from the issue of a quinine ration to regiments in the vicinity of New Berne, N. C.

mony adverse to this method of prophylaxis had been received by the Commission. Reports favorable to the issue of quinine were made to the Surgeon General's Office by certain medical officers, and some communications were received by Dr. WOODWARD in response to a letter requesting information on the subject. These are herewith submitted.

Surgeon C. N. CHAMBERLAIN, *10th Mass. Vols., Washington, October* 1, 1861.—The fevers were of a bilious remittent type, some rapidly assuming a typhoid form. At first they were of a very severe character, and four treated in our regimental hospital proved fatal. One became convalescent and left the hospital for his quarters, but owing to imprudence he suffered a fatal relapse. Another was delirious from the first, his skin literally covered with petechiæ and vibices; he had severe congestions of the head and bowels, and sank after an illness of ten days. The third and fourth had all the phenomena of ordinary typhus fever, and both died of severe and repeated hemorrhages from the bowels. As the epidemic progressed the type of the disease became milder, although we still have occasionally cases of a severe character. The treatment employed has been usually a mild laxative of castor oil and oil of turpentine, often preceded by five grains of blue pill; full doses of quinine, and an occasional Dover's powder, after the operation of the cathartic. This has sufficed to arrest very promptly the large proportion of the cases, while it mitigated the others, excepting the few cases more emphatically typhoid in their tendency which ended fatally.

After witnessing the salutary effects of quinine as a remedy, I determined to employ it as a prophylactic, provided a sufficient quantity could be procured. An appeal to the Sanitary Commission secured twenty-three gallons of whiskey containing three grains of quinine per ounce of liquor. The men were allowed to take daily one or two ounces, and I was happy to witness its results in reducing the morning report of the sick from fifty or sixty to twenty daily. After the supply was exhausted the reports exhibited an increase of the disease. I am prepared to recommend emphatically the use of quinine as a prophylactic under circumstances parallel to our own. A second small supply, furnished also by the Sanitary Commission, has been of great service.

Medical Inspector JOHN WILSON, *U. S. A., Army of the Potomac, October* 31, 1864.—The ordinary endemic diseases of the region have touched the Army of the Potomac [before Petersburg] with unwonted gentleness during the usually sickly autumnal months. This, at least in a measure, is due to the vigilant surveillance kept over the police of the camps and the cleanliness of the person of the soldier, and also to the excellent manner in which the army has been fed and clothed. In the more malarious localities occupied by our troops during the months of September and October, a ration of whiskey and quinine was given daily with excellent effects as a prophylactic.

Asst. Surg. ALFRED A. WOODHULL, *U. S. A., in charge of Battalion of 2d and 10th U. S. Infantry, September* 30, 1862.—The whiskey ration that was at one time attempted is, in my opinion, not only unprofitable but absolutely detrimental when it is issued indiscriminately, even under the worst aspect of military life on the Chickahominy. It is unprofitable, because on those occasions when it would be of service, if at all, it is often impracticable to issue it. If useful, it is chiefly in the depression and exhaustion induced by wet and cold, immediately after a fatiguing march; but as these are the very times when the wagons are not up, it is impossible to obtain it until the occasion for its use has passed. The transportation of the required amount would greatly burden the Quartermaster's department, an item in the movements, and consequently in the health, of the army not to be overlooked. Its habitual issue would unquestionably tend to the production of intemperate habits in some and foster those of others that a campaign might otherwise dissipate. While accustoming men to a stimulant, to be deprived of at those times they would most need it (as indicated above), would be doing a double injury. The addition of quinine does not seem to counterbalance the evil, and so great a consumption of that valuable drug appears to be a waste which nothing but the most certain benefits should authorize. To leave the issue of quinine to the legitimate channel of the medical department is much more rational than its indiscriminate administration by battalions. Of course these remarks refer to the circumstances of the Army of the Potomac, and not to those climates where perpetual cinchonism is the condition of life to the white.

Surgeon J. G. BRADT, *26th Mass. Vols., New Orleans, La., March* 31, 1863.—The rainy season continued through the last quarter, and probably had an effect upon the health of the regiment, as shown by a considerable increase in the number of cases of intermittent fever. Wet days, followed by sudden changes to warm, muggy weather, have invariably increased the prevalence of this fever; but all the cases occurred among men who had previously suffered from the disease. I consider that the city is comparatively free from the miasm to which malarial fevers owe their origin, and that these fresh cases are merely the reappearance of an old trouble which had been lying dormant in the system. To test the value of whiskey and quinine as a prophylactic, I procured fifteen gallons of whiskey and added one ounce of quinine to the gallon. This mixture was served out to the guard at night at the rate of one ounce per man. In wet weather a ration was also served out at midnight. I am positive that it prevented a great number of attacks of chills.

Surgeon DAVID MERRITT, *55th Pa. Vols., Beaufort, S. C., May* 10, 1863.—The issue of a ration of whiskey and quinine while the regiment was on Edisto Island was of great service to the health of the command. At Beaufort the ration has only been issued to the men on picket duty. I am a strong advocate of the measure, and the oral testimony of other medical officers corroborates my opinion.

Asst. Surg. E. A. THOMPSON, *12th Me. Vols., Baton Rouge, La., February*, 1863.—Most of the cases of intermittent fever which occurred during the winter were observed in the companies that were exposed to malaria during last summer while on detached service at Lake Pontchartrain. We are now issuing rations of quinated whiskey to the men on picket and extra duty with marked benefit.

Medical Inspector E. P. Vollum, U. S. A., *Evansville, Ky., December* 31, 1863.—I have to state that from my experience with quinine-whiskey as well as with simple quinine, I am led to believe that it is a prophylactic against malarial fevers. When troops are about to enter or abide in a region well known to be malarious, I would advise the moderate use of quinine-whiskey to be continued in diminished quantities as long as it is evident that the troops are in danger of attack; but I would discountenance its general issue except at such seasons and in such regions as are malarious undoubtedly.

Medical Inspector A. C. Hamlin, *U. S. A., Washington, D. C., November*, 1863.—**My observations have not been** conducted to an extensive scale, but the results have convinced me that the use of quinine-whiskey in prophylactic doses possesses a genuine and energetic action, and augments the organic forces in resisting the pernicious influence of malaria **and neutralizing the paludal poison: but when paludal cachexia is once fairly established the administration** of quinine seems to be without much force. I will now state that I consider the best mode of administering this drug is to dissolve it in the red wines by means of their tonic effect upon the muscular fibre; and I believe, **with the distinguished chemist Henry, that the red wines of Burgundy are best adapted to the purpose.**

Surgeon A. P. Maylert, *U. S. Vols., Louisville, Ky., November* 4, 1863.—**I think that the issue of quinine or some** act[illegible] as a prophylactic, could be and only [illegible] to the Government. Alcohol is [illegible] the best counteractive by its stimulating action, and pure old whiskey the best form of alcohol: but inasmuch as it would be impossible to obtain the latter, I would recommend that distilled rectified spirits, i. e., pure diluted alcohol, be used for this purpose. I regret greatly when proper is administered as prophylactic to a limited extent, but [illegible] such, as to [illegible] the fever. The effect is [illegible] the reverse. I would therefore recommend that it not be used [illegible] the alcohol should bear as small a proportion to the antiperiodic as may be.

Surgeon T. H. Gaillard, U. S. Vols., *Washington, D. C., November* 2, 1863.—I know quinine-whiskey is of great use and proper [illegible] against malarial fevers. However, I am opposed to the mixture, and think its general issue would cause much harm, owing to the fondness of many for whiskey. I am in favor of a mixture without whiskey, though **I would in some cases have recourse to whiskey as well as to quinine.**

Surgeon E. Swift, *U. S. A., Chester, Pa., November* 22, 1863.—**In June, 1847, at Vera Cruz, Mexico, I recom**mended two grains of sulphate of quinia in about two ounces of whiskey, to be taken by the officers every morning at the moment of rising. This could not be administered to the men for want of sufficient supply of the liquor. The effect was universal, generally beneficial, and I did not discover any marked difference between officers and men. In Texas I frequently recommended this prophylactic in malarious districts, and credited it with an influence in warding off disease. So fully convinced was I of this fact, as Medical Director of the Army in Kentucky in December, 1861, I urged General Mitchell to approve a daily issue of quinine-whiskey, but the advance of the army into Tennessee prevented me from making satisfactory observations. In a circular published to the Army of the Cumberland by order of General Rosecrans, I find the following directions, viz: "Hot coffee should be issued to the troops immediately after being in the morning, and in inclement weather quinine and whiskey in the evening."

Favorable testimony is also found in some of the reports printed in the Appendix to the First Part of this work,* and in certain articles published by army medical officers in the medical journals.† Unfortunately this testimony is in no instance based upon statistics showing the comparative effect of like exposures upon persons using the quinine and others not using it. On the other hand no reports condemning the prophylactic use of quinine have been published,‡ although doubts have occasionally been expressed as to its

* See, for instance, that of Surgeon C. S. Tripler, Medical Director, Army of the Potomac, pp. 47–8, in which he states that, having received favorable reports of the effects of quinine and whiskey as the result of an experimental issue made by his medical officers, he recommended its use to those regiments whose condition seemed most to demand it, and was informed thereafter to keep it constantly on hand in the Purveyor's store. See also p. 47, where Surgeon J. B. Brown, Medical Director, 6th Army Corps, expresses himself satisfied that had a liberal supply of quinine been obtainable for prophylactic purposes and treatment, one-half of the sickness that prevailed in his command during the advance on Williamsburg, Va., in 1862, would [illegible] prevented. Also, on pp. 78–9, Assistant Surgeon Harvey E. Brown, U. S. Army, states that his regiment, the 70th N. Y. Vols., while on the Peninsula, was seriously threatened with intermittent fever, but that a liberal administration of quinine dissolved in whiskey to the whole command prevented the progress of the disease. Also, on pp. 282–3, Surgeon Geo. E. Cooper, U. S. Army, after referring to the generally received opinion that [illegible] on the low marshy grounds bordering the rivers of the southeastern coast, and to the feeling of anxiety consequent on the [illegible] to construct and garrison fortifications on these borrom lands, states that: "The medical officers on duty in the batteries were instructed to issue to the men quinine and whiskey as a prophylactic: and with beneficial effect it was used, as the statements of the medical officers informed me. With reference to the prophylactic use of quinine, I would state that in such cases as came under my own observation I saw much good resulting from [illegible] I would strongly recommend its use in all malarious districts, for though the expense is considerable the benefit following will, I think, more than compensate for the outlay."

† See notice from Brigade Surgeon Geo. H. Lyman—*Boston Med. and Surg. Jour.*, Vol. LXV, 1862, p. 312—in which the prophylactic use of quinine is highly commended: see also the same journal, LXIX, 1863, p. 169, where Surgeon George Derby, 23d Mass. Vols., relates his experience with this drug [illegible] Beaufort, N. C., and vicinity, and strongly commends its use as a prophylactic.

‡ I except the following: A board of surgeons consisting of Drs. G. H. Gay, C. D. Homans, R. M. Hodges, specially detailed by the Governor [illegible] Massachusetts troops [illegible] Florida, [illegible] Fla., and therefore quinine must be administered in large doses. The ill effect from this large dosing was found to be much [illegible] the [illegible] malarial influence. The improvement in every instance where the quinine was either entirely stopped or given [illegible] and [illegible] to leave a shadow of a doubt as to the exciting cause of the persistent headache and [illegible]

value.* In view of the general tenor of the testimony, it must be allowed that quinine exercised a protective influence. Nevertheless, as the practice of administering it for its prophylactic virtues was generally abandoned in the later years of the war, it must be conceded that the results achieved did not equal the expectations which were at first entertained. But a consideration of the well-known temporary action of the drug on the system will readily explain its failure to protect where the exposure in a malarious country was so prolonged as during our civil war. An intermission in the use of the quinine, by leaving a command exposed to the miasm, necessarily put an end to the prophylactic experiment. The sickness of those who became affected by the malarial influence and the idiosyncratic immunity of others under similar exposures rendered unnecessary, in many instances, the further expenditure of quinine as a preventive, and led to the gradual abandonment of the method by our medical officers. Practically, therefore, the prophylactic use of quinine in our armies was a failure; but it does not follow that the method, so far as employed, was not of value. On the contrary, all who adopted it give positive evidence on this point. Men were saved from attack and preserved in perfect health for the active service of the time-being by the use of the drug. That it did not continue to save them after its use was intermitted does not detract from the value of the protection already rendered. That it did not save from attack every one to whom it was administered is no argument against its prophylactic use. Its efficacy even as a remedy is unequal, some cases requiring more, some less, for the suppression of the morbid phenomena, and in certain instances in which the morbific influence is overwhelming, quinine, although well known to be of remedial value, is unfortunately of no value. Its efficacy as a preventive may not be supposed to be more equable than its remedial power. The malarial influence may be so overpowering that the prophylactic dose may be as inefficient for prophylaxis as the remedial dose for cure. From these considerations it would seem that the quinine which was used with a view to prophylaxis was of value in preserving health temporarily, and that the disuse of the method was due not to a recognition of its want of value, but to the difficulty attending its successful prosecution in cases of prolonged exposure, especially as the periods of active service which led the troops into dangerous bivouacs and surrounded them with predisposing conditions were precisely those in which there was the greatest liability to a failure in the issue of the prophylactic doses.

Nor must it be forgotten, in a discussion of the prophylactic value of quinine, that although, owing to conditions of continued exposure, the attempt to protect whole commands was given up during the later years of the war, the protection of individuals from relapses continued to be practised to the last, not by issues of quinine and whiskey, but by the administration of the drug in repeated doses, covering several days at a time, or by larger doses given at specified periods. The success of this mode of treating relapses, really a prophylactic use of the drug, bears strongly on its value when used under favorable conditions for the protection of healthy men from the miasmatic influence.

of the *Chicago Medical Journal*, Vol. XIX, 1862, p. 416, who remarks: "Is not this monstrous 'quinine prophylaxis nonsense about played out'? The word of its promise is not even kept to the ear, and the humbug proves dangerous as well as expensive." The report of the Massachusetts physicians is not understood, however, to refer specifically to the use of quinia as a prophylactic, but rather to its alleged abuse in the treatment of the sick. The prophylactic use is probably objected to in the remarks of ALEX. LE B. MONROE—*Letter to the Surgeon General of the State of Massachusetts, Boston Med. and Surg. Jour.*, Vol. LXVII, 1862–3, p. 21—who, writing of a brief tour of duty in the Army of the Potomac during June and July, 1862, says: "We found a great many patients who had suffered from over-dosing with quinine administered in whiskey."

*J. J. WOODWARD—*Outlines of the chief Camp Diseases, etc.*, Philadelphia, 1863, p. 168 *et seq.*—speaks doubtingly of the prophylactic value of quinine, first, on account of its failure to become an accepted method of prevention in the army, and secondly, on the claim that its continued use establishes a tolerance of the remedy by which its curative powers are to a great extent lost. "The general use of quinine-whiskey as a preventive of malarial disease is therefore to be regarded as unadvisable. * * * Quinine should be reserved for employment as a therapeutic measure in the treatment of the actual symptoms of malarial disorders when they appear in individual cases."

The experience of the war appears to teach that, when a command is to be temporarily exposed in a specially dangerous locality, quinia should be issued for the sake of such protection as it may give; but that when the command is to be stationed for a long time in a malarious section, prevention should be attempted by the judicious selection of camp sites and the avoidance of predisposing causes, while quinine is reserved for remedial exhibition on the first manifestations of the malarial poison in the system, and for special prophylactic doses under conditions of temporary exposure or in anticipation of relapses.

The whiskey ration is brought incidentally into question by its connection with the quinine. Dr WARREN has expressed the prevailing sentiment of our medical officers with regard to it. As a matter of fact, the campaigns of the civil war were made on hot coffee with a ration of whiskey under special conditions of fatigue or discomfort. The sanitary reports are therefore generally silent on the subject of the whiskey ration *per se*.

On the Confederate side attention was directed at an early period of the war to the prophylactic use of quinine by Dr JOSEPH JONES, who cited in support of his favorable opinion the severity of its successful employment by English naval vessels on the African coast.* This essay was subsequently embodied, with some additional matter, in a report made by JONES to the Surgeon General of the Confederate Army in August, 1861.†

From this report it appears that quinia had not been employed as a prophylactic to any extent in the Confederate Army solely because of a scarcity of the drug. Nevertheless it had been used on a small scale with decided benefit in certain malarious localities. Asst Surg. J. N. WARREN, 20th South Carolina, stationed on James Island, S. C., gave four and a half grains daily to two hundred men of his regiment, from April to October, 1863. Four cases of malarial fever and one of typhoid occurred among these men. The remainder of the regiment, between three and four hundred men, did not take the prophylactic, and over three hundred cases of paroxysmal fever, with twenty-three of typhoid, occurred among them. Surgeon SAMUEL LOGAN § chief surgeon of the 2d and 3d Military Districts, Department of South Carolina, Georgia and Florida, tried quinia in four-grain doses daily as a prophylactic during the summer and autumn of 1863, in garrisons of several small commands stationed in malarious districts of South Carolina. The coast line is indented with numerous bays, inlets and salt-water creeks which contribute to the formation of a series of islands consisting of light sand supported by a clay stratum a few

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* Quinia in ague.—Effects of large doses experimentally used upon many men in the Confederate army. Southern Med. and Surg. Jour. Vol. XVIII. August, 1862, p. 497. [Joseph Jones remarked that surgeons of young regiments were frequently deterred by the fear that quinia would in some cases produce the occurrence of paroxysms of fever, prior to completion of vaccination, which would be of a very serious character. The experiment of large doses was therefore made with the prophylactic and curative powers of quinia, during the formation of the camp of instruction at Augusta, Georgia, during the months of June and July, 1861, when several cases of the disease occurred. Dr. JONES's report of the result of this experiment is published in the Report of the Surgeon General for the year 1861. London, 1862, pp. 249-251 : also the same for the year 1862. London, 1863, pp. 249-251 : also the same for the year 1863. London, 1864, pp. 249-251 : also the same for the year 1864. London, 1865, pp. 249-251 : also the same for the year 1865. London, 1866, pp. 249-251 : also the same for the year 1866. London, 1868, pp. 249-251 : also the same for the year 1867. London, 1869, pp. 79-85.

† *Quinine as a Prophylactic against Malarial fever: being an appendix to the Third report on Typhoid and Malarial fevers, delivered to the Surgeon* [illegible] Richmond, 1863. [Richmond Jour. of Med. and Surg., Vol. IV. 1863, p. 448 et seq. In these reports to the Surgeon General of the Confederate Army, Dr. JONES has collected the statistical results of the employment of quinia as a prophylactic by various commands in the field and in garrison, during the years 1861 and 1862. The following is a summary of the results of the use of quinia in the Army of Northern Virginia, during the months of June, July, August and September, 1862, when the troops were encamped in the vicinity of Richmond, Va. The command consisted of 87,000 men, and during the months mentioned there were 18,000 cases of intermittent fever, with 200 deaths. Had these men, during the months mentioned, received, each, 50 grains of quinia per week, the total amount required would have been 900,000 grains, or 2,250 ounces. At the then market price of quinia, this would have cost $4,500. The additional cost of the quinia required for prophylaxis would thus be $2,890; but against this he offsets the pay of the men in the hospital. Assuming 200 men to be constantly off duty in the unprotected command, their pay per annum, estimated at $13,200, would amount to $6,600 in a year. Dr. JONES thus argues in favor of the use of quinia as a prophylactic. Besides the reports of Surgeons WARREN and LOGAN, mentioned in the text, he also reprints a report by Surgeon OCTAVUS WARE, dated James Island, S. C., May 7, 1862, in which the writer refers to the employment of quinia as a prophylactic in the case of a large body of troops on James Island, and recommends the employment of quinia in large doses and for a limited period, rather than in small doses and for a long period. He says, in fact, that the use of quinia as a prophylactic should be limited to the use of quinia in large doses for a short time, and that the use of quinia in small doses for a long time is worse than useless.

‡ Surgeon WARREN was promoted to be Surgeon of the 20th.

§ SAMUEL LOGAN. *On the physiological effects of quinine. United States Med. and Surg. Jour.*, Vol. I. p. 81. This article was republished by its author : in the Savannah Med. Jour. for 61, 1860, p. 62.

feet below the surface. Towards the interior the light sea-island soil gives place to level tracts of stiffer earth, sandy, but mixed with red clay, on which the undergrowth is extremely luxuriant. These lowlands are intersected by swamps, some bearing rice, and all composed of an alluvium on blue clay. Beyond this the pine barren region, a dry, porous sand with clay underlying it at a considerable depth, becomes gradually changed into the rolling ground which leads up to the mountain slopes. Malaria prevails in the sea-islands, in the low-levels and in the lower part of the pine barrens. The higher parts of the last, and some of the first are exempt from fevers; but as the Union troops occupied all the healthy portions of the shore, the rebel lines of defence ran through the unhealthy lowlands just within the belt of sea-islands. During the summer months most of the troops were moved to the healthy pine lands, but some, chiefly cavalry commands, were retained for outpost duty in the sickly low grounds. To these quinine was administered as a prophylactic; but it was not taken by all, although all were exposed to similar influences. This failure on the part of some to make use of the quinine gives a value to Dr. LOGAN's statistics by permitting a comparison to be made between the sick rates from malarial disease among those who did and those who did not use the drug. His results were as follows:

Total number who took no quinine 230; had fever 134; ratio per 1,000 of fever cases to patients 582.60, or 1 in every 1.71 patients; ratio per 1,000 of severe cases to total cases 313.43, or 1 in every 3.19 cases. Total number who took quinine irregularly, 246; had fever 96; ratio per 1,000 of fever cases to patients 390.24, or 1 in every 2.56 patients; ratio per 1,000 of severe cases to total cases 291.66, or one in every 3.71 cases. Total number who took quinine regularly 506; had fever 98; ratio per 1,000 of fever cases to patients 193.67, or one in every 5.16 patients; ratio per 1,000 of severe cases to total cases 326.53, or 1 in every 3.06 cases. It would seem from these statistics that although not an absolute prophylactic, the degree of protective power possessed by the agent fully warrants its use. If four-fifths of the fever cases are prevented, it should surely be used. It may be well to explain that under the head of *number who took quinine irregularly* are included those who would forget or neglect to take it some three or four days in the week, or take it one day and forget it the next, or omit it for a week at a time.

On the other hand it has been stated by Dr. HERRICK of Louisiana, that quinia was issued in a spirit ration to the crews of the Confederate fleet in Mobile Bay during the summer of 1863, by order of the Confederate States naval commandant, but the result of the trial was not satisfactory and it was soon discontinued.*

It is not difficult to add to the list of authorities brought forward by VAN BUREN and JONES in support of the prophylactic virtues of quinia. On this side of the question may be cited the papers of MERRITT, ROGERS, HERRICK, BARTHOLOW, VIVENOT, JILEK and HAMILTON, and the favorable opinions expressed by EASTON, DUTROULAU, STILLÉ, H. C. WOOD and HERTZ.† Moreover, favorable notices of the successful employment of the measure on the West Coast of Africa may be found in the official volumes containing the statistical returns of the health of the Royal Navy subsequent to those cited

*S. S. HERRICK—*Quinine as a therapeutic agent. Trans. Amer. Med. Association*, Vol. XX, 1869, p. 618.

†J. KING MERRITT—*Quinine as a Prophylactic in Malarious regions. Amer. Med. Times*, Vol. III, 1861, p. 305. STEPHEN ROGERS—*The Protective or prophylactic preventive and some points in the Curative uses of Quinine, etc. Trans. Med. Society, N. Y. State*, 1862, p. 181; also, *The Prophylactic and the Therapeutic uses and abuses of Quinia and its salts. Trans. Amer. Med. Association*, Vol. XX, 1869, p. 187. Both MERRITT and ROGERS instance their experience on the Isthmus of Panama as authorizing their favorable opinion. S. S. HERRICK—cited in last note. ROBERTS BARTHOLOW—*Army hygiene. Proceedings Connecticut Med. Society*, Vol. III, 2d series, 1868–71, p. 76; also, *Quinine and its salts*, in same Vol., p. 96; also, *A Practical Treatise on Materia Medica and Therapeutics*, New York, 1876, p. 131. RUDOLF RITTER VON VIVENOT, JUN.—*Ueber die prophylaktische Anwendung des Chinin gegen Malaria-intoxikation. Med. Jahrb.*, Wein, 1869, S. 39. In this paper the writer relies almost wholly on the essay of Van Buren, cited note ‡, p. 166, *supra*, and the English naval experience, which he gleans chiefly from the work of C. FRIEDEL—*Die Krankheiten in der Marine, geographisch und statistisch, nach den "Reports on the Health of the Royal Navy," dargestellt*, Berlin, 1866. A. R. VON JILEK—*Bietrag zur Prophylaxe gegen Marlariafieber. Wochenblatt der k. k. Gesellschaft der Aerzte in Wein*, April 27, 1870 (No 17), S. 177. J. BUTLER HAMILTON—*Remarks on the value of Quinine as a Prophylactic. Indian Med. Gaz.*, Vol. VI, 1871, p. 233. This author relates that at Jubbulpore, in 1866, he gave three grains of quinine every second day to each of 135 men under his immediate charge; few cases of fever and no deaths occurred among them, the average number in hospital not exceeding four per cent. of the command. At the same time and place 500 men of the 23d R. W. Fusileers, who did not use the quinia prophylaxis, were attacked with severe remittent fever, having at one time as many as 150 of their number sick in hospital, and 150 more convalescent from the fever, encamped on the hill close by: "The number of deaths I cannot remember, but I think they were about 20." A. F. DUTROULAU—*Traité des Maladies des Europ´ens dans les pays chauds*, 2e edit., Paris, 1868, p. 253. J. A. EASTON—*General observations on poisons, etc. Glasgow Med. Jour.*, Vol. VI, 1858, p. 273. ALFRED STILLÉ—*Therapeutics and Materia Medica*, 3d edit., Philadelphia, 1868, Vol. I, p. 454. H. C. WOOD—*Treatise on Therapeutics*, 2d edit., Philadelphia, 1876, p. 73. HENRY HERTZ—*Malarial diseases*, in *Ziemssen's Cyclopædia of the Practice of Medicine*, Vol. II, Amer. transl., New York, 1875, p. 657.

in the paper of VAN BUREN. These notices are indeed so laudatory as to warrant the anticipation that the statistics would show a considerable and permanent reduction in the frequency of malarial fevers among the sailors of this station after the general introduction of the prophylactic use of quinine under the auspices of DAWSON in 1854; but an examination of the actual figures does not show any such reduction, although of late years the mortality has been very materially diminished.

The shore operations of the Ashanti war led to a high rate of prevalence of malarial fevers among the men of the British Navy and undermined the faith of their medical officers in the prophylactic virtues of quinine. Staff Surgeon DE RENZY expressed a doubt;* Staff Surgeon LUCAS gave an unhesitating denial;† Surgeon MANN (then on the staff of the quartermaster-general) declared that his unfavorable opinion was shared by European residents in West Africa;‡ and Sir ANTHONY H. HOME, principal medical officer, reported that he had been unable to recognize any value in quinine given in prophylactic doses, for it seemed neither to ward off attacks nor to mitigate their severity.§

MOREHEAD, from his observations in India, concurred in the opinion that the evidence in favor of the power of quinia to prevent paroxysms and remittents or moderate their severity was by no means conclusive.‖ LIVINGSTONE, during his expedition to the Zambesi, found that those of his men who took quinine as a preventive were attacked with fever as frequently as those who did not attempt thus to secure protection.¶ LEVY, from his experience in Algeria and Italy, led him to an equally unfavorable opinion.** The prophylactic was tried without success among the Russian troops in the Crimea.†† WARREN, in 1862, suggested its use in the Austrian army and navy during the year 1863 when [illegible]‡‡

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* Surgeon JAMES THOMSON, of the *Amethyst*—*Statistical report for 1874*, pp. 130 and 131—writes: "Whether any prophylactic treatment can be considered successful in this climate is a problem for the future. I confess to considerable disappointment in the present case, although I think it probable that the mild convalescence of [illegible] cases of malaria was due to modifying influence. It is, moreover, worthy of remark that I have heard [illegible] having a similar impression."

† Surgeon LEONARD LUCAS, of the *Tyne*—*Statistical report for 1874*, p. 106—"A question arises here [illegible] attacks of remittent fever. Unfortunately [illegible] these men were attacked with fever as frequently as those who did not attempt this method of preventing it. I am inclined to think that the quinine [illegible] them daily, yet within a month all these men were attacked [illegible] fever, and some [illegible] the month fixed on further. It does not appear that [illegible] so unfit for men to live in; but those billeted in [illegible] escaped fever in consequence, because [illegible] and have since equally well. It remains to be proved whether its administration as a prophylactic [illegible] to shorten the attack of fever when [illegible]."

‡ Deputy Surgeon-General SIR ANTHONY H. HOME, K. C. B. [illegible]—*Medical history of the War in Ashantee, 1874*, p. 227—"[illegible] ward off attacks nor to mitigate the severity of [illegible] three-grain dose produced transient deafness, and in a few others [illegible] I am not aware that I [illegible] any [illegible] prophylactic [illegible] three-grain dose produced transient deafness, and in a few others [illegible] symptoms [illegible] of the kind after using. From the [illegible] I am unable to appreciate the value of [illegible] prophylactic [illegible] of the [illegible] of the West Indies without [illegible] Nevertheless, [illegible] the disease [illegible] were [illegible] using [illegible]."

§ [illegible]

‖ [illegible]

¶ [illegible]

** [illegible]

†† [illegible]

‡‡ [illegible]

somewhat favorable results in a detachment of marines at Pola on the Adriatic;* but a similar experiment at the same time and place by the surgeon in charge of the 29th infantry gave about the same proportion of cases among those who took the quinine as among those who did not; and equally unsatisfactory results were obtained in the case of several small cavalry detachments on the Danube, as also, during the same year, among the troops forming the large garrison of Komorn.†

The evidence bearing on the virtues of quinia as a prophylactic against malarial fever is therefore by no means uniformly affirmative; but in the instances of failure or of doubtful benefit there is always that prolonged exposure which, as we have seen, led to the disuse of the method in our armies during the war. BÉRENGER-FÉRAUD recognized the difference between temporary and prolonged exposures in this connection, and even specified that if the exposure was to be continued for more than twenty days, prophylaxis need not be attempted.‡ Moreover, some of the instances of failure may perhaps be attributed to the inadequacy of the quantity given. Quinine as a prophylactic has usually been administered in comparatively small doses. A grain and half to three grains daily as used by JILEK, and two grains daily as at Komorn and elsewhere in Austria, might well be regarded as inefficient; yet HAMILTON, with three grains every other day, reports one of the most brilliant instances of success.§ Most of those who in this country have recommended the quinine prophylaxis have insisted on a daily dose of four or five or even more grains.

HERRICK advocated the view that the most effectual plan is not to make daily use of quinia, but to resort to it in decided doses on the first appearance of malarial symptoms.‖ This opinion, which was based on his experience of intermittent fever in his own person, corresponds with that which has been given above as to the proper mode of meeting the dangers attending the prolonged exposure of an army in malarious districts.

Similar in principle was the plan pursued by the medical officers of the English army during the war of 1879 in Zululand. Surgeon General WOOLFRYES reports that during the sickly season quinine was administered three times a week to all the debilitated men.¶

The opinion expressed by HAMILTON that quinoidine used for the purpose in view is more efficacious than quinine, is not as yet supported by adequate evidence.**

Besides the doubts that have occasionally been thrown upon the power of quinia to prevent malarial fevers, the serious objection has been urged that those who take the drug

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*JILEK—*op. cit.*, note †, p. 172, *supra*. The quinia was given in 1½ to 3-grain doses daily in rum; 500 men took it from June 1 to September 20, 1881, among whom there were 91 cases, while among 236 men who did not take it there were 68 cases. JILEK thinks, too, that the cases among those who took the quinia were milder than among those who did not.

†These facts are reported in an article *Erfahrungen über die prophylaktische Anwendung von Chinin und Ext. nucis vomicæ gegen Malaria-Intoxikationen, Allg. Militärärztliche Zeitung*, 1870, No. 10 u. 11, S. 76 *et seq.* Two grains were given daily in spirits of wine. At Komorn, between January 1 and August 25, 1869, there were 1,449 intermittents in a mean strength of 5,360 men, or 270 per 1,000 for the time named. This is spoken of as less than the usual proportion of cases at the post, but as there were neither floods nor prolonged heats during 1869, it was considered doubtful whether the lessened prevalence was really due to the quinine.

‡L. J. B. BÉRENGER-FÉRAUD—*Op. cit.*, note **, p. 173, *supra*, t. I, p. 246.

§HAMILTON—cited p. 172, *supra*.

‖HERRICK—*loc cit.*, note *, p. 172, *supra*, says: "In 1864 the writer had occasion to test the value of quinine as a preventive of intermittent fever in his own person, and became convinced that the most effectual plan was not to make a daily use of it, but to resort to it in decided doses on the first warning. It is only necessary to exercise constant vigilance, for a paroxysm is generally preceded by unmistakable signs of malaise for a day or two previously, and the attack can be warded off by a few timely doses of quinine."

¶Surgeon General J. A. WOOLFRYES—*Medical History of the war in Zululand in* 1879; *Army Medical Department Report*, 1879, London, 1881, p. 299: The strength of the regular troops of this command was 13,333 officers and men, of whom 2,941, or 220 per 1,000, were taken on sick report with fevers between January 4 and October 3; the proportion of malarial fevers is not stated.

**J. BUTLER HAMILTON—*Report on the action of Quinoidine and Cinchonine as regards their influence on Malarious fevers; Indian Med. Gaz.*, Vol. VI, 1871, p. 50—gave to each soldier of a detachment of 80 men at Allahabad, from August 3 to November 16, 1870, three grains of quinia daily; to each of a detachment of 67 men the same quantity of cinchonine, and to each of a third detachment, also of 67 men, the same quantity of quinoidine. In the first detachment there were 7 cases of ague, or 87 per 1,000; in the second 13 cases, or 194 per 1,000; in the third 5 cases, or 77 per 1,000; whence he concludes that quinoidine ranks highest and quinine next in prophylactic virtue. On the other hand GORE—p. 164, *op. cit.*, note ‡, p. 173, *supra*—reports that the men of the West India regiment who occupied the camp at Napoleon during the Ashanti war took daily a solution of quinoidine without deriving any particular benefit.

habitually acquire in time a tolerance of its action, in consequence of which its power as a remedy becomes lost.* But, as during our war there frequently occurred cases in which, without the previous administration of quinine as a prophylactic, this remedy failed to break up the paroxysms, necessitating a recourse to arsenic and other antiperiodics, it is possible that this tolerance to the habitual use of the drug may have been really due to some peculiarity in the individual or in the attack. It has also been represented that gastric and intestinal irritation, loss of appetite, headache and even diarrhœa result from its continued use;† but although these accidents undoubtedly occur in some highly susceptible individuals, it is not unlikely that in most cases the medicine is undeservedly blamed for symptoms referable to the coincident malarial and other morbid influences. This explanation unquestionably applies to the opinion sometimes expressed by soldiers,‡ that the fevers and other serious results of malarial intoxication from which they suffer are caused by the medicine employed to prevent them,—an opinion sustained by MALONE and MCDANIEL in this country, and by the Sicilian physician TOMASELLI and others, whose error has been sufficiently exposed by the criticism of BÉRENGER-FÉRAUD.§

PROPHYLACTIC USE OF OTHER MEDICINAL AGENTS.—Several other medicaments have been said to act as prophylactics against intermittent fever. The only one of these mentioned in the official reports as having been tried during the civil war was the bark of the willow. Assistant Surgeon HUNTER, in a report of his inspection, August 31, 1864, of certain regiments in camp near Thibodeaux, La., states that a spirituous infusion of willow-bark had been used by the 33d Ill. Vols. with fair success;‖ but the monthly report of sick and wounded of this regiment, on file in the Surgeon General's Office, shows that during the month stated no less than one-third of the men were taken sick with intermittent or remittent fever.¶

In the Confederate armies the *Cornus florida* or dogwood was used in some instances

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* STILLÉ in his *Therapeutics and Materia Medica*, Philadelphia, 1874, Vol. I, p. 519—refers to this toleration of the medicine and its loss of remedial power as dangers inherent in daily doses continued for any length of time, and quotes Dr. GRAVES (*Dublin Quarterly Jour.*, February, 1846, p. 72) as perhaps the first to call attention to this subject. Dr. GRAVES, after a comparative trial of several methods of administering quinine in a case of obstinate quartan ague, concluded that it was best to withhold the remedy until premonitions of a fit occurred, and then to give it in large doses; for if continued throughout the apyretic interval "the system becomes accustomed to its impression and is less powerfully affected than when it is taken only at such times as the development which it is adapted to remedy is about to occur." It appears to the writer that the tolerance and loss of power are by no means proved by Dr. GRAVES's experiment. The allowable conclusion does not reach further than the greater efficacy of large as compared with small and repeated doses, which is now a well recognized fact in all malarious districts. See, for instance, a reference to Dr. CHARLES MCCORMICK's experience, cited at p. 172, *supra*. Nor does Dr. WOODWARD give any ground for the assertion as to the loss of antiperiodic power. J. J. WOODWARD—*Outlines of the Chief Camp Diseases*, Philadelphia, 1863, p. 171: "The system in time acquires a tolerance of the action of quinia, and when acute malarial affections supervene, as they frequently do, the grand therapeutic agent on which the surgeon relies is found to have lost its curative power to a great extent." BARTHOLOW—*Army hygiene*, cited note †, p. 172, *supra*—says: "Quinine loses its power by long continued use; its antiperiodic power is not exhibited satisfactorily in cases of chronic malarial poison, and hence its prophylactic power is feeble in the same morbid state." ROGERS—*Trans. Amer. Med. Ass.*, 1869, p. 200,—expresses the opinion that insusceptibility to the therapeutic effects of quinia is seldom met, except in those who have used it continuously, and recommends, therefore, that "considerable intervals of abstinence" should be practiced by those who employ it prophylactically. Surgeon A. G. DELMEGE, of the British navy, who had charge of a detachment of Royal marines landed at Cape Coast Castle during the Ashanti war of 1873—*Statistical Report*, 1873, p. 206,—states that the officers of the Army Medical Staff who had served for long periods on the coast advised him to give quinine as a prophylactic, adding, "those of its men who were especially exposed, as by its constant use" such a tolerance of it was created that when attacked with fever it would require enormous doses to produce any effect." GORE—p. 164, *op. cit.*, note ‡, p. 173, *supra*—states that it is a general idea among the English residents in West Africa "that when taken *de die in diem* it loses its power as a remedy."

† Such symptoms were referred to the quinine in the report from Komorn, cited p. 174, *supra*, although only two grains daily were given.

‡ As for example by the English soldiers in the Crimea, according to Sir JOHN HALL, cited in note ‖, p. 167, *supra*, and during the Ashanti war, according to Sir ANTHONY HOME, note §, p. 173, *supra*.

§ MALONE and MCDANIEL expressed the belief that while quinine did not cause malarial hæmaturia it determined an attack or recurrence in those liable to the affection from continued exposure to the malarial influence. See note on *hæmorrhagic malarial fever*, *supra*, p. 128; and also SALVATORE TOMASELLI—*L'intossicazione chinica, etc.*, Catania, 1877—abstracted in the *Bull. de l'Acad. de Méd.*, 2e série, t. VI, 1877, p. 756; G. B. UGHETTI—*L'intossicazione chinica e la febbre biliosa emoglobinurica*, *Lo Sperimentale*, 1878, p. 614; and the paper of KARAMETZAS in the Bull. of the Medical Society of Athens, session of Nov. 18–30, 1878. BÉRENGER-FÉRAUD—*L'intoxication quinique et l'infection palustre*, *Archives de Méd. navale*, t. XXXI, 1879, p. 355—has thoroughly exploded this charge, and shown that the untoward symptoms attributed to quinia are really those of hæmaturic remittent fever. A similar explanation of the views expressed in TOMASELLI's paper was offered in the Acad. of Medicine, Bull., vol. cited *supra*, p. 778, by LE ROY DE MÉRICOURT.

‖ See his report, p. 155, *supra*.

¶ The report is signed by Assistant Surgeon H. T. ANTIS, of the 23d Illinois Volunteers. Mean strength of the command 631 officers and men; 197 cases of intermittent fever and 20 of remittent are reported—total 217; of the intermittents 5 were congestive, and two of these died.

instead of quinine as a prophylactic. Circular No. 12, issued from their Purveyor's Office August 22, 1862, refers to an arrangement by which whiskey medicated with dogwood and other indigenous barks was to be used by the troops as a protective against malaria.* Dr. JOSEPH JONES reports that this compound tincture was issued by the purveyors to troops serving in swampy districts, and was employed with good effect in preserving them from malarial fevers.†

VII.—TREATMENT OF MALARIAL DISEASE.

GENERAL CONSIDERATIONS.—Prior to the introduction of cinchona bark into medical practice the system by which these fevers were treated was palliative and uncertain, depending chiefly on the special symptoms manifested by the individual case. The primary congestions suggested the propriety of bloodletting, but the subsequent deterioration of the blood, so marked as to have originated the name *putrid fever*, caused much opposition to this measure. The introduction of cinchona as an element in the treatment was opposed by those who considered bloodletting essential, and advocated by such as looked specially to the putrescent character of the developed disease. At first the bark was regarded as an antiseptic, and was given in conjunction with camphor and wine; but, as early as 1765, Dr. JAMES LIND trusted to it alone as a specific antidote to the disease-poison.‡ Its value was also urged by HUNTER, CLARK and others.§ But in 1804 its use

* This circular is quoted from Dr. JONES's article cited in the next note: "Although no orders have been issued to that effect, some of the purveyors appear to be under the impression that they should make a mixture of the indigenous barks (dogwood, &c.) and whiskey. The arrangement intended by the Surgeon General and Commissary General is, that the Commissary Department shall furnish the whiskey to the troops, giving each man one drink a day. The Purveying Department was to furnish the barks to mix with the whiskey, to make a species of army bitters, as a preventive against malaria, &c. The arrangement is merely an issue of whiskey by the Commissary Department to the troops, and the Purveying Department furnish the bark to mix with it. This office has not yet been instructed whether the mixture is to be made at the purveying depot or at the commissary depot. Therefore whiskey will not be issued in other than the medical preparations that have been or may be ordered as regular issues."

† As, for instance, to the Eutaw (25th South Carolina) regiment, whilst it was encamped upon James' Island, in a notoriously malarious locality. This regiment had a mean strength of about eight hundred officers and men. During the summer and autumn of 1862 one-third of the command was at times upon the sick-list with the various forms of malarial fever. "The assistant surgeon of this regiment, J. W. WARREN, of South Carolina, communicated to the author, during his inspection of the sick upon James' Island, some interesting facts upon the prophylactic powers of certain indigenous remedies. A compound tincture, or medicated whiskey, prepared by the Medical Purveyor from the dogwood, cherry, poplar and willow barks, was administered daily, in the proportion of one-half to one gill to each man during two weeks in the month of September, 1862. Under the use of this tonic mixture the number of new cases of malarial fever diminished one-half, although as the autumnal season advances upon James' Island malarial fevers increase in number and severity. The supply of this medicated whiskey being limited, at the end of two weeks it was exhausted, and in the course of eight days the cases of malarial fever had increased from thirty-six to eighty. A fresh supply having been obtained its use was again commenced, and in the course of five days the number of cases of malarial fever fell to the original number." Dr. JOSEPH JONES—*Indigenous remedies of the Southern States, &c., No. 2, Dogwood.—St. Louis Med. Reporter*, 1868, p. 306.

‡ *An Essay on Diseases incidental to Europeans in Hot Climates*, by JAMES LIND, M. D., F. R. S., Sixth Ed., London, 1808, p. 323 *et seq.*: "The preparation of the body requisite previous to the administration of the bark is not considerable. It is sufficient to cleanse the stomach and alimentary canal by an emetic or purge. * * * The bark may be administered at any period of the disease. When the ague is slight it need not be given till a second fit has evinced the true nature of the disease; but when the ague is severe there is frequently an absolute necessity of administering it upon the first intermission, even with scarce any preparation of the body: instances have occurred, on unhealthy spots in England, of agues having been so malignant after hot summers that a return of the fit sometimes proved fatal." * * * After adverting to the opinion that an ague must continue some time before it is completely formed, and that till such time it is highly dangerous to apply any remedy, he continues: "The advantage of administering the bark as early as possible in the disease fully appeared in the year 1764 and the two following years, during an uncommon prevalence of remitting and intermitting fevers, which spread themselves over the greater part of England and furnished me with a number of patients laboring under all the symptoms of these diseases. * * * I never prescribed the bark until the patient was free from the fever; and then without regard to a cough or any other chronical indisposition I ordered it to be given in large doses. I have given the bark in every circumstance attending intermitting fevers during their remission, but never gave it during the fit."

§ JOHN HUNTER—*Observations on the Diseases of the Army in Jamaica*, London, 1788—speaking of the cure of intermittents, says, p. 208: "When the intermissions were complete the bark was given directly without any previous evacuations in order to cleanse the stomach and bowels, which is to be considered as rather recurring to an old than giving in to a new practice. There was no inconvenience arose from omitting the vomiting and purging, usually made to precede the bark; on the contrary it was so much time gained." HUNTER refers to SYDENHAM's use of bark in this manner. JOHN CLARK—*Observations on the Diseases which prevailed in long voyages to hot countries, particularly on those in the East Indies*,—London, 1809: "As soon as the intestinal canal has been thoroughly cleansed the cure [of the remittent fever] must entirely depend on giving Peruvian bark in as large doses as the patient's stomach will bear, without paying any regard to the remissions or exacerbations of the fever. If the remissions be distinct the bark, indeed, will have a more speedy effect in subduing the fever; but even if it become continued, by a regular and steady perseverance in the medicine it will be effectually prevented from growing dangerous or malignant."

was checked by the experience of Dr. JAMES JOHNSON,* who, finding that his first case of remittent at Calcutta rejected the remedy and died with an engorged liver and congested brain, had recourse in his succeeding cases to venesection and evacuants. Moreover, the beneficial effects of twenty-grain doses of calomel taken by himself during an attack accompanied by dysenteric symptoms† led him to urge this practice, which for many years afterward sent Europeans back from India with their constitutions shattered by repeated salivations.

As the evils of the mercurial system were developed, bleeding was resorted to freely and repeatedly as the only efficient remedial measure. Meanwhile, in 1820, quinine was discovered and its use introduced into England and France, but several years elapsed before it was employed by the Indian practitioners in those dangerous remittents for which bleeding to relieve congestions, free purgation to remove vitiated secretions, and calomel and opium to act on the secretory and excretory functions, constituted the standard treatment, although Sir J. ANNESLEY and TWINING‡ made use of small doses of quinine, when full remissions

* *The Influence of Tropical climates on European Constitutions*, by JAMES JOHNSON, M. D., Second Ed., London, 1818, p. 48—after referring to the instructions for treatment given in the works of Drs. CLARK and LIND, he describes his first case as follows: "A young man, of a good constitution, in the prime of life and health, had been assisting with several others to navigate an Indiaman through the Hoogly. The day after he returned he was seized with the usual symptoms of this fever. I did not see him till the cold stage was past; but the reaction was violent; the headache intense; skin burning hot; great oppression about the præcordia, with quick hard pulse; thirst and nausea. An emetic was prescribed, and towards the close of its operation discharged a quantity of ill-conditioned bile, both upwards and downwards; soon after which a perspiration broke out, the febrile symptoms subsided, and a remission, almost amounting to an intermission, followed. I now, with an air of confidence, began to "throw in" the bark, quite sanguine in my expectations of soon checking this formidable disease. But, alas! my triumph was of very short duration; for in a few hours the fever returned with increased violence, and attended with such obstinate vomiting that although I tried to push on the bark through the paroxysms, by the aid of opium, effervescing draughts, &c., it was all fruitless; for every dose was rejected the moment it was swallowed, and I was forced to abandon the only means by which I had hoped to curb the fury of the disease."

† *Op. cit.*, in last note, p. 208: "I was bled, and took an ounce of castor oil immediately; a few hours after which six grains of calomel and one of opium were taken, and repeated every five hours afterwards, with occasional emollient injections. The day passed rather easier than the preceding night; the tormina were somewhat moderated by the medicine; but I had considerable fever, thirst, restlessness and continual calls to stool; nothing, however, coming away but mucus and blood. As night closed in the exacerbation was great. The opium lulled me occasionally, but I was again delirious; and the phantoms that haunted my imagination were worse than all my corporeal sufferings, which were, in themselves, indescribably tormenting. The next day I was very weak; and so incessant were the griping and tenesmus that I could hardly leave the commode. The tenesmus was what I could not bear with any degree of fortitude; and, to procure a momentary relief from this painful sensation, I was forced to sit frequently in warm water. The calomel and opium bolus was now taken every four hours, with the addition of mercurial frictions. An occasional lavement was exhibited, which gave much pain in the exhibition, and I each day took a dose of castor oil, which brought off a trifling feculence, with inconsiderable relief. My fever was higher this day than yesterday, with hot, dry, constricted skin. As night approached my debility and apprehension of the usual exacerbation brought on an extreme degree of mental agitation. The surgeon endeavored to cheer me with the hope of ptyalism, which, he assured me, would alleviate my sufferings—I had then no local experience in the complaint myself. As the night advanced all the symptoms became aggravated, and I was convinced that a fatal termination must ensue unless a speedy relief could be procured. I had no other hope but in ptyalism; for my medical friend held out no other prospect. I sent for my assistant and desired him to give me a scruple of calomel, which I instantly swallowed, and found that it produced no additional uneasiness; on the contrary I fancied it rather lulled the tormina. But my sufferings were great; my debility was increasing rapidly, and I quite despaired of recovery! Indeed I looked forward with impatience to a final release! At four o'clock in the morning I repeated the dose of calomel, and at eight o'clock (or between 60 and 70 hours from the attack) I fell, for the first time, into a profound and refreshing sleep, which lasted till near midnight, when I awoke. It was some minutes before I could bring myself to a perfect recollection of my situation prior to this repose; but I feared it was still a dream, for I felt no pain whatever! My skin was covered with a warm moisture, and I lay some considerable time without moving a voluntary muscle, doubtful whether my feelings and senses did not deceive me. I now felt an uneasiness in my bowels and a call to stool. Alas, thought I, my miseries are not yet over! I wrapped myself up, to prevent a chill, and was most agreeably surprised to find that, with little or no griping, I passed a copious, feculent, bilious stool, succeeded by such agreeable sensations—acquisition of strength and elevation of spirits—that I ejaculated aloud the most sincere and heartfelt tribute of gratitude to Heaven for my deliverance! On getting into bed I perceived that my gums were much swollen and that the saliva was flowing from my mouth. I took no more medicine, recovered rapidly and enjoyed the best state of health for some time afterwards."

‡ JAMES ANNESLEY, of the Madras Medical Establishment—*Researches into the Causes, Nature and Treatment of the more prevalent Diseases of India and warm climates generally*. London, 1828. Vol. II, p. 490 *et seq.*—recommends in agues the moderation of the cold stage, if severe, by the hot or vapor bath, frictions and the internal administration of camphor, ammonia, ether, wine, brandy and water or other stimulants. When the vascular excitement of the hot stage is excessive, general or local bleeding is suggested, especially in the plethoric and when accompanied with determination to the head and delirium, or to the liver and spleen, with symptoms of inflammatory action in those viscera. Cooling diaphoretics, as the nitrate of potash, acetate of ammonia, camphor julep, antimonials, etc., are also recommended as promoting the speedy supervention of the sweating stage. When the paroxysm has ceased an emetic is given, and its operation encouraged by the free use of diluents, after which a full dose of calomel, fifteen or twenty grains, is administered, followed by a purging draught, and if these fail to act within a few hours, their operation is assisted by a cathartic enema. "Having thus promoted discharge of the morbid secretions and fæcal accumulations, and removed local congestions by bloodletting, we may resort to the exhibition of bark so as to prevent the accession of the paroxysm. Unless purgatives have been employed previously to the exhibition of bark, so as effectually to carry off morbid accumulations, and unless local determinations of blood and congestions are removed by general or local depletions, we shall resort to this most valuable medicine to little purpose: for it will either not be retained on the stomach, or it will fail of producing its febrifuge effects if retained, and occasion destruction and enlargement of the liver and spleen." Quinine, although in use in England, had not been introduced into medical practice in India at the time ANNESLEY wrote. Similarly in remittent fever: "Bark may be resorted to in the remissions. But care should be had not to give this medicine during active demonstrations to the head, liver, lungs or spleen until such complications have been removed by vascular depletion, either general or local, and by the judicious employment of whatever means the particular circumstances of individual cases may require."—*On the effects of Bleeding in the cold stage of Intermittent fever*, by W. TWINING, Esq., *Trans. Med. and Physical Society of Calcutta*, 1831, Vol. V, pp. 58–100. TWINING adopted and advocated the method introduced by MACKINTOSH of Edinburgh, of bleeding in the cold stage to relieve the heart and large vessels from

were established, to prevent a return of the paroxysm. Even as late as 1861 Sir J. R. MARTIN gave the administration of quinine a secondary place in the list of remedial agents.* But during this time Dr. HARE was urging the antidotal power of quinine in these malarial fevers. He obtained successful results from thirty-grain doses, and from an extensive and systematic experimental practice of this method, advocated its use in the pernicious fevers of India to the exclusion of other remedial means excepting the occasional use of small doses of calomel when there was gastric irritability.† Nevertheless the value of the treatment by quinine may not be considered as fully established in Indian practice, for HORTON, in 1879, did not consider the remedy admissible until portal and abdominal congestion and epigastric irritation had been relieved and the febrile action moderated.‡

In France, MAILLOT, from an experience of many thousand cases of pernicious intermittents, urged an immediate recourse to quinine in large doses.§ But perhaps to American medical men is due the credit of having been the first to use quinine in large doses and irrespective of preliminary evacuant treatment, as antidotal to the malarial poison; for PERRINE

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their state of engorgement, to unload the lungs and remove congestion of the brain and spinal marrow; but as he did not consider that venesection superseded the necessity of using other remedies, according as the nature of the existing symptoms and the course of the disease might demand, he occasionally used the sulphate of quinine or powdered bark combined with purgatives. See also his *Diseases of Bengal*, Calcutta, 1832, p. 627, where he says: "In every description of remittent fever we must watch the changes which take place; and when the pyrexia abates administer sulphate of quinine for the purpose of preventing a return of the exacerbation; in most cases where the cerebral symptoms are not urgent and continued the effect of this remedy is undoubted."

* Sir J. R. MARTIN—*The Influence of Tropical Climates*, London, 1861, p. 430: "Quinine, the great febrifuge, justly administered acts purely as a nerve tonic to the cerebrospinal and visceral sympathetic system. Exhibited in extravagant doses it is toxical and not therapeutic." And again, on page 360: "Subject only to the limitations already stated, bleeding—early bleeding—whether general or local, *and always practised at the very outset of the stage of reaction*, is very generally necessary in the severer forms of Bengal remittent fever; then come full doses of calomel and sudorifics, short of producing salivation, with saline purgatives, antimonials and refrigerants, and quinine in the intervals."

† E. HARE—*On the Treatment of Malarious fevers. Med. Times and Gazette*, London, 1864, p. 540: "In 1843 I was sent to Segowlie, on the borders of the Nepal Terai, the most deadly in India, and there remained for four years. I was called to a distance on one occasion to see a medical gentleman with cholera. He died, and left me a valuable medical library, in which I found the now scarce works of LIND and HUNTER. Their practice was new to me, and I read them with eagerness. I had seen enough of the standard practice to be dissatisfied with it, especially in some recent cases I had treated of the Terai fever. They all died. No remission took place; there were head symptoms, and I durst not give quinine. In fact, it was so utterly forbidden by all authorities that it never occurred to me to give it. I tried to salivate, but the fever was so active that my patients were dead before the mercury had time to affect them. It then struck me as remarkable that since the discovery of quinine no one had tried it in the same way as LIND and HUNTER had used bark, from the dread of increasing congestion and inflammation, and a case quite hopeless under the common treatment soon offered itself to me, and I determined to try quinine. * * * I found a young lad of about 20 lying quite insensible on a native bed. The natives said that he was traveling on a pony in the Terai, had fallen off insensible in their village, and fearing he should die there and cause suspicion they had brought him to the nearest doctor. I immediately mixed one scruple of quinine in some wine, and by giving him a teaspoonful at a time made him swallow the whole of it. I repeated it every four hours three times that day. Early in the morning he was sensible. I gave him another dose and some arrowroot and milk. He took the same doses throughout this day, with some soup, and the next to my delight he was out of danger, having taken two and a half drachms of quinine in forty-eight hours, and without much inconvenience. * * * In the first place, no blood was drawn either by lancet or leeches. Bleeding, therefore, is not necessary, and the disease not inflammatory. No opium; no purgative to bring away bad secretions; no drug of any kind is required, except quinine, for the successful treatment of malarious fever. Quinine also may be given in the largest doses, whether there are head symptoms, delirium, coma or pain in the liver. Whether it be in the hot stage or cold quinine is not only safe for all forms of malarious fever, but its certain cure; and in cases where there is danger to life the earlier and the larger the doses of quinine which can be given to the patient the better. * * * * Quinine, therefore, may with reason be pronounced as a direct antidote to the poison of malaria, and not simply as an antiperiodic and adapted only to stop periodicity, for it always cured equally well those fevers in which there were no periods, but which continued without the slightest remission during the twenty-four hours."

‡ J. A. B. HORTON—*The Diseases of Tropical Climates and their Treatment*, London, 1879—speaking of quinine as useful in preventing the recurrence of the paroxysm, says, p. 93: "This valuable remedy requires some caution in its administration in this disease; in large doses it should on no account be given when the paroxysm of fever is on the patient, and more especially when there are signs of gastric or cerebral inflammation or congestion, with scanty or depraved secretions, full and hard pulse, as it may lead to the fixing of the inflammatory and congestive tendency to the brain. Quinine is safe, and should be administered when there is a complete remission; when there is no sign of venous congestion; when the pulse is reduced in frequency and force; when the skin is moist and the secretions free."

§ *Traité des fièvres ou irritations cérébro-spinales intermittentes d'après les observations recueillies en France, en Corse et en Afrique*, par F. C. MAILLOT, Paris, 1836. See pp. 360 *et seq.*, where he speaks to the following effect: Many practitioners, still under the influence of obsolete ideas, are accustomed to use laxatives and purgatives to prepare the stomach for the reception of quinine. This custom is generally followed in Italy and in several marshy districts of France, Holland and Germany. TORTI, in applying this method, acted consistently with his principles; in a great number of cases, however, he was forced on account of the gravity of the symptoms to expedite matters and give quinine without employing this hackneyed preparation; which fact, it seems to me, ought to have put him in the right path, or, at least, shown him the uselessness of this medication. In ordinary intermittent fevers the employment of laxatives sometimes suspends the attack, but more often its only effect is to put off for a time the use of quinine—which must always be had recourse to in the end. The more energetic purgatives and emetics increase the congestions which take place in the digestive mucous membrane of which the coating of the tongue is merely an indication; they may rapidly raise these irritations to a higher degree—to inflammation. * * * In fact while laxatives are being administered pernicious attacks often take place; but even admitting that purgatives and emetics do not increase the gastro-intestinal irritation, they have the greater inconvenience of permitting attacks to occur, which by their violence and continuance always add to the dangers of the disease and to the difficulty of its treatment. It is clear that when our predecessors used purgatives and emetics to prepare the stomach to receive quinine, they followed rather their medical theories than the teachings of experience. * * * Having observed several thousand cases, I think that immediately after and sometimes before bleeding, sulphate of quinine ought to be used whatever may be the symptoms. Neither the persistence of the arterial excitement nor the signs of gastro-enteritis ought to bar its employment. All the morbid phenomena will disappear as if by enchantment in a few hours.

in 1826 advocated the employment of large doses at any period of the fever,* and this practice was common among our army medical officers during the Florida war.†

During the War of the Rebellion quinine was the one great mode of treatment for malarial disease. Other drugs and remedial measures were used as called for by particular conditions of system; but other antiperiodics were seldom employed except in cases in which quinine after a fair trial failed to eradicate the disease.

In addition to the notes of treatment found in the clinical and post-mortem records submitted in this chapter, and to the references which appear in the sanitary and special reports already printed,‡ the following answers are presented as bearing on this subject:§

[illegible] W. W. GRANGER, of Mo. Cav., Butler, Mo., October, 1862.—Ten cases of intermittent fever, both quotidian and tertian, except two, have yielded readily to quinine combined with carbonate in equal proportions. In the two exceptional cases the system, through frequent use, had apparently lost its susceptibility to the effects of quinine, either alone or in combination with stimulants or opiates. These cases finally yielded to nitrate, induced an hour or two in advance of the expected chill, and followed as soon as the stomach would tolerate it with one-fourth of a grain of sulphate of morphia, two grains of capsicum and one-fourth of a grain of sulphate of copper, given every three hours during the intermission. One of the cases presented the unusual phenomena of inversion of symptoms, that is, the prevalence of the hot stage, followed by the cold. I think decided advantage resulted in this case from the use of quinia alone in the intermission, and the administration of capsicum in ten-grain doses as soon as the sweating stage arrived, continuing every hour till the chill had passed off.

There were sixteen cases of remittent fever, twelve of which began with languor and indisposition to action, constipation, full and frequent pulse, dusky sensorium, pain in the head and as the patient expressed it, in the bones and flesh generally. Five of these experienced much restlessness during the later stages. Convalescence was reached in from four to sixteen days and was rapid in nearly every case. Treatment consisted of a purgative of calomel and powdered rhubarb, followed in six or eight hours by castor oil and turpentine or wine, when necessary. After free evacuation, quinine in full doses was administered during the remission; and during the accession bathing, cold or tepid as proved agreeable, Dover's powder, nitrate of potash and sweet spirit of nitre were relied on with satisfactory results. I found nothing better than cold or tepid sponging as a refrigerant, anodyne and indigenant in remittent fever; and when the fever was associated with irritation of the kidneys, a cold wet cloth over the lumbar region acted satisfactorily as a diuretic. In cases characterized by much restlessness, sponging was an efficient anodyne, and almost indispensable when cerebral hyperæmia commanded and the use of opiates. Under this course the remissions became longer, the febrile accessions lighter; the circulation resumed its natural character, the skin

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* BENJ. SERING.—*Fever treated with large doses of Quinine in Adams county, near Natchez, Mississippi.* *Philadelphia Jour. Med. and Phys. Sci.*, 1826, Vol. VI, pp. 60–64. [illegible] "My observations at that period were in favor of the successful issues of treating our autumnal fevers, during progress or paroxysm. Beyond question of the [illegible] A dram [illegible] its symptoms in the pulse and skin are subdued. [illegible] usual power. Subsequent attempts to form fever should be counteracted by a large dose of quinine.

† The *Statistical Report on the Sickness and Mortality in the Army of the United States*, etc., p. 2, [illegible] Washington, 1860, [illegible] Medical history [illegible] Mississippi, [illegible] number [illegible] [illegible] the [illegible] [illegible] [illegible]

its moisture and the system its tone. Aromatic sulphuric acid was used as a tonic. The four remaining cases differed in having no constipation at the beginning, and in greater mildness throughout, yielding in from four to six days to quinine during remission, and five grains of Dover's powder during accession, given every five hours, and followed by the acid tonics during convalescence.

Surgeon EZRA READ, 21*st Ind. Vols., Camp Dix, Baltimore, Md., September* 5, 1861.—In the treatment of intermitting fever I have relied upon sulphate of quinine in full doses, giving from one to two scruples in twenty-four hours to arrest the periodicity. During convalescence I have continued the same in five-grain doses every morning, and have had no relapses and no unfavorable results from visceral enlargements.

Surgeon JNO. W. SCOTT, 10*th Kansas Vols., September* 30, 1862.—As was to have been expected, most of the cases were malarial fevers, chiefly of a remittent type; a few assumed a decidedly typhoid character, and to these was due most of the mortality. Pure intermittents were of rare occurrence, there being in almost every case more or less febrile action in the intervals; but this, as a rule, occasioned no delay in the administration of antiperiodics, as the combination of diaphoretics with quinia sufficed to counteract any unduly stimulant effect of the latter,—and the cases yielded to treatment with the usual facility. The fevers, remittent and intermittent, have shown during the past summer a much slighter tendency to relapse than usual; and we have met with none of those cases of enlargement of the abdominal viscera and general debility which are so often the result of continued attacks of autumnal fevers in this climate. Doubtless this marked exemption from the usual sequelæ of ague has direct relation to the fact that so few cases of the disease have occurred. The cause which produces by its intensity a great number of cases must, by its persistent action, occasion relapses in constitutions debilitated by previous attacks.

Surgeon D. W. HENDERSON, 96*th Ohio Vols., Louisville, Ky., November* 19, 1862.—The regiment left Camp Bates [four miles from Covington, Ky.] October 8, 1862, marching to Falmouth, Ky. * * * In all cases of intermittent fever larger doses of quinine are required here than north or in home practice, twenty-five to thirty grains being generally needful to accomplish the desired object.

Surgeon DAVID MERRITT, 55*th Pa. Vols., Beaufort, S. C., May* 10, 1863.—We have had in the regiment very many cases of intermittent fever which have yielded promptly to the following mode of treatment: First, I give an emetic consisting of two grains of tartar emetic and twenty of powdered ipecacuanha in conjunction with capsicum. Then, as soon as the stomach becomes quiet, I administer ten grains of calomel combined with twenty of jalap. After the bowels have been freely opened I give large doses of sulphate of quinia, which generally arrest the paroxysms speedily. In some cases I have given the solution of arsenite of potassa to ward off the hebdomadal chill and its sequences, but generally I keep on with the sulphate of quinia in two-grain doses three times daily, or it may be in larger doses and oftener, knowing well that the mere arrest of the paroxysm is only an apparent and not a real cure. I may also mention that in several cases of intermittent fever I have cut the chill short and prevented a paroxysm, both since being with this regiment and when in Iowa (near the Mississippi river above Dubuque), by the mere administration of the emetic above mentioned, with the exception that in these cases more of the capsicum was added to the other ingredients. I have frequently given quinine in twenty-grain doses since arriving at this place with the effect of a speedy arrest of the intermittent paroxysm, and then, by continuing the remedy in smaller doses, have been much gratified with the result. With regard to the sulphate of cinchonia I cannot bear very favorable testimony, and would much rather depend upon the sulphate of quinia, with which, if it produces gastric distress, I administer a few drops of tincture of opium. We have also had in the regiment numerous cases of remittent fever, many of which have been complicated by periodical congestion of the bowels, manifested by mucus and bloody stools, in some cases simulating dysentery. The uncomplicated cases have been mild, and readily yielded to treatment. An emetic was first given, if indicated, then a mild cathartic, followed by blue mass and Dover's powder, neutral mixture or a solution of acetate of ammonia, and finally sulphate of quinia.

Surgeon B. F. HARRISON, *Independent Battalion, N. Y. Vols., Morris Island, S. C., January* 9, 1864.—[This battalion arrived at Hilton Head, S. C., February 1, 1863, and subsequently, to the date of the report cited, served in the Department of the South.]

There is probably no point in which the medical history of the battalion is more peculiar than in the small amount of quinine which has been used. I commenced my service with it at Yorktown, Va., on August 18, 1862. At that time intermittents prevailed, and no quinine was on hand. I borrowed one ounce, and before the first of January, 1863, had obtained thirty ounces from the medical purveyor. Since the commencement of the year (1863) to the 16th of November, I obtained thirty ounces more from the purveyor, and of this we have now fourteen ounces on hand, so that not more than forty-six ounces have been consumed during fifteen months, whilst at the same time there have been regiments in the field by the side of us, doing no harder service and having no greater number of men than ours, which have used an ounce a day for a considerable portion of this period. In one regiment in particular, which was in camp near us in Virginia, and has been with us almost constantly since, there were, according to the sick reports, three or four times as many cases of intermittent fever during the month of October of this year as we had. This and many other circumstances have convinced me that the consumption of quinine in the army is larger than is useful, and perhaps, even injuriously large, as well as a source of large and useless expenditure. I never give quinine as a prophylactic in a case where the paroxysmal character of the disease has not been distinctly manifested. My practice is, when the intermittent paroxysm has once exhibited itself, if the patient is still in the cold stage, to give half an ounce or an ounce of whiskey with some hot drink, and, if there are no violent symptoms, to let the paroxysm pass, modifying or assuaging some of the most uncomfortable manifestations as may seem necessary. About two hours before the next paroxysm is expected I give eight or ten grains of quinine in one dose; and if the paroxysm is kept off, I give two or three grains less two hours before the next paroxysm is

expected; and if that does not occur I again diminish the dose by two or three grains, and again repeat two hours before the next paroxysm is expected, and thus give from two to five doses, by which time the disease has usually disappeared. But I am not always so fortunate as to control the disease in this prompt and easy manner, and sometimes twelve grains are necessary to "break the chill;" and oftentimes the system is out of order in other ways, the tongue coated, the appetite gone, the digestion disordered, and in other respects the patient may be suffering from conditions which should be attended to; all the functions should be brought into the most healthy condition.

Surgeon CLAIBOURNE J. WALTON, 21*st Ky. Vols., Army of the Tennessee, December* 31, 1862.—The intermittent and remittent fevers observed in this regiment have yielded readily to the use of quinine. Twenty grains given at one dose usually prevent the return of the paroxysm in intermittent cases. The same quantity given in five-grain doses during the twenty-four hours (without regard to the remission) and continued in some cases for two days, with or without mercury, is sufficient to relieve a remittent.

Surgeon JOHN WRIGHT, 107*th Ill. Vols , Elizabethtown, Ky., December* 31, 1862.—The intermittent fevers observed in this regiment have been generally treated with antiperiodic doses of quinine, preceded by a cathartic in cases of constipation, and associated with opium in cases of diarrhœa. Sixteen to twenty grains of quinine, given during the intermission, sufficed to prevent a return of the chill. Remittents have been treated on the same plan, the quinine being given during the remission, and with favorable results, the remission in a few days becoming an intermission. Occasionally there has been great irritability of the stomach; in such cases large doses of laudanum appeared to answer well.

In INTERMITTENTS the sulphate of quinine was usually administered in doses of three to five grains, repeated every few hours during the intermission. Where the disease was common and deaths from sudden congestions rare, these doses were given three or four times a day, with the intention of favorably modifying and ultimately suppressing the succeeding paroxysms. But where the occasional occurrence of fatal congestions infused into the case a possible danger to life, the remedy was administered with especial intent to immediately suppress the morbid manifestations. To this end the dose was repeated at such intervals that ringing in the ears or other symptoms of cinchonism might be produced, or failing this, that a specified quantity might be taken, before the time when the next paroxysm was conceived to be due. Thus, in case 55, five grains were ordered for administration at 8, 10, 12 and 2 o'clock, to anticipate a paroxysm expected at 3.30 P. M. The quantity needful to effect this object varied with the section of the country which gave rise to the disease. Thus, while WRIGHT says that sixteen to twenty grains, given during the intermission, were sufficient to prevent a return of the chill, HENDERSON states that twenty-five to thirty grains were generally required to accomplish this. But the quantity varied also in individual cases, some requiring more some less; and these peculiarities becoming known in primary attacks, dictated the quantities prescribed in subsequent relapses.

The danger attaching to the recurrence of the chill led to the very general adoption of the practice of giving one or more large doses as being more efficient than the repetition of a smaller dose. The large dose was usually administered early in the intermission, that time might be afforded for its full absorption and efficient action before the period of the expected return. Thus the medical officer of the 19th Mass. Vols., in cases 5, 13 and 41, gave fifteen grains at once, and continued the remedy thereafter in three- or five-grain doses at intervals. PECK gave fifteen to twenty grains morning and evening; MERRITT, WALTON and others twenty grains. HARRISON, who comments on the unnecessary expenditure of quinine in some commands, states that a practice leading to economy of the drug in his own charge consisted in the exhibition of ten-grain doses to ward off expected chills; but he allows that he was not uniformly successful, and that twelve grains had sometimes to be given. A few reports referring to methods of administration speak of the use of evacuants prior to the exhibition of quinine; but that this was not usual in practice may be gathered from the clinical records, where the remedy is generally ordered at once and unaccompanied by a cathartic. When called for by the condition of the tongue or

bowels, blue pill and opium were combined with the quinine, or a mercurial was given, followed by Epsom or Rochelle salts, or the citrate of magnesia; capsicum was frequently used as an adjuvant, especially in the Western armies. Emetics were seldom given; but MERRITT and GRANGER refer to their successful use in preventing recurrences. When gastric irritability interfered with the administration of quinine, opium was considered of value; Hoffmann's anodyne, ice and sinapisms were also used to overcome occasional vomiting. Diarrhœa as a complication was treated with Dover's powder, opium or aromatic powder in conjunction with quinine or camphor, or with opium combined with acetate of lead or nitrate of silver. During the paroxysm little was done other than to make the patient as comfortable as possible and to abridge the febrile stage by the use of hot drinks.

Quinine was used as freely to prevent anticipated relapses as to suppress expected paroxysms after the relapse had occurred. For this purpose small doses were occasionally continued for several days; but more generally the patient was directed to report at the end of the first, second and third weeks for the administration of a large dose in anticipation of a relapse at those periods; or he was cautioned to be on the outlook for premonitory symptoms and instructed to report for treatment immediately on their appearance. An occasional dose of blue pill, when the tongue was furred, was also given as a part of this prophylactic system.

Strychnia was sometimes employed in obstinate cases, as in case 4, in which it was combined with blue pill and capsicum. But when quinine failed to prevent relapses, medical officers generally had recourse to Fowler's solution, which was often found beneficial. After the paroxysms were controlled quinine was not unfrequently resumed in roborant doses with other vegetable tonics and the tincture of iron; or the citrate of iron and quinine was employed. Surgeon TOWLE considered the removal of the patient from the malarious atmosphere of the greatest importance in treating obstinate fevers, and urged the advisability of having such cases removed from the exposures incident to camp life in tents, stating that many cases in his practice which had proved refractory to quinine recovered when the patients were tranferred from a tent to the better protection of a house.*

REMITTENTS.—In the treatment of remittents the sulphate of quinine was generally used, often with capsicum or blue pill and opium, in five or more grains, repeated four or five times in the twenty-four hours. Frequently a mercurial cathartic, followed by a saline, was given; but the administration of quinine was not delayed for the action of the bowels. The specific remedy was prescribed during the pyrexial periods as well as during the remissions, but when the latter were well marked, larger doses were administered during their continuance, while acetate of ammonia, spirit of nitre and neutral mixture were employed during the exacerbations. Local congestions were not permitted to interfere with the administration of quinine, as they were believed to originate in the miasmatic influence, and were found to be relieved when the latter became counteracted or modified by specific medication. Turpentine emulsion was frequently used in the diarrhœa accompanying these cases. Dover's powder was often given to restrain the bowels, promote perspiration and secure rest. In some instances of hemorrhage from the intestines, enemata containing persulphate of iron were employed. Vomiting was controlled as in the intermittent fevers.

* S. K. TOWLE, Surgeon 30th Mass. Vols.—*Notes of Practice in U. S. A. General Hospital*, Baton Rouge, La., during the year 1863. *Boston Med. and Surg. Jour.* Vol. LXX, 1864, pp. 49–56. "While on the Potomac I was so well pleased with the progress of typhoid cases in hospital tents that I thought them as good as houses; but since being in this department I have become convinced that cases of malarial disease do very much better in buildings than in tents—the canvas protecting the patients much less than boards from the two great excitants to the action of miasmatic poison, the heat of the sun and the chilly heavy dews of night."

Sinapisms or blisters were applied on account of pain in the hypochondriac or umbilical regions; and calomel, opium and taraxacum were administered when indications of jaundice appeared. Active catharsis, as by calomel, rhubarb and salines, was used in the few sthenic cases which occurred, in conjunction with low diet, cold to the head, mustard to the feet, and very exceptionally, bloodletting. Digitalis was sometimes employed with the quinine when there was much cardiac excitement. Aromatic sulphuric acid was used to restrain excessive perspirations, and carbonate of ammonia and alcoholic stimulants when the prostration was great.

CONGESTIVE FEVER.—In congestive cases the sole reliance was on quinine. Dr. GALLOUPE* expressed the general opinion in saying that in these cases no treatment was of any avail except that by quinine; and that when cinchonism was rapidly produced the disease was promptly and almost invariably broken up. Large and repeated doses were given, irrespective of the condition of the patient as to collapse, fever, intermission, head symptoms or intestinal inactivity or derangement. Other measures were employed as adjuncts during the stage of collapse, as mustard emetics, capsicum, alcoholic or ethereal stimulants, stimulating enemata, hot frictions and sinapisms or the hot bath. HEWITT recommended the application of iodine to the spine, which was assumed to do good by relieving passive congestion of the cord, thus enabling the organ to generate and transmit power sufficient to remove local obstructions and restore integrity of vital function.†

CHRONIC MALARIAL POISONING.—Quinine was also given in cases of chronic malarial poisoning, but in these it was by no means so efficacious as in the acute manifestations of the disease. D'AVIGNON, speaking of such cases at New Berne, N. C., says that the ordinary remedies were of no avail; and in case 52, reported above, iodide of potassium, iron in various forms, vegetable bitters, mineral acids, stimulants, counter irritants and anodynes were employed for three and a half months, during which the patient seemed rather to decline than improve. Removal to a non-malarious climate was apparently essential to recovery from this condition of chronic poisoning. The deteriorated blood had to be improved before the general health could be re-established, and this could not be effected so long as the individual remained exposed to the influences which had caused his disability. This was well recognized by our medical officers, and furlough, discharge from service or removal for treatment to some northern hospital was their usual prescription. Iodide of potassium internally and iodine applied to the region of the spleen, with tincture of iron and small doses of quinine, or the citrate of iron and quinine, and the best diet procurable, constituted the routine treatment of such cases, special symptoms receiving attention as they became prominent. At the Satterlee Hospital, Philadelphia, Fowler's solution succeeded in allaying supraorbital neuralgia in several instances in which quinine gave no beneficial result,‡ while extract of belladonna applied locally was a means of temporary relief. At Quincy, Ill., this neuralgia was favorably affected by forty grains of chlorate of potash, twelve of citrate of quinine and iron and two of capsicum, given in four doses during the day.

UNTOWARD EFFECTS OF QUININE.—The medical records of the war make no mention

*See his report, *ante*, p. 144.

†See his report in the Appendix to the first part of this work, p. 313.

‡An Assistant Surgeon (name not given)—*Effects of latent Malaria, roused into activity by an exciting cause. Med. and Surg. Reporter*, Vol. X, 1863, p. 100—describes several cases of periodic neuralgia in soldiers brought to hospital from the Army of the Potomac, in which arsenic succeeded after quinia had failed. See, also, letter from Surgeon GEORGE B. WILLSON, 3d Mich. Vols., from Camp Michigan, Va., Feb. 25, 1862, *Boston Med. and Surg. Jour.*, Vol. LXVI, 1862, p. 109,—in which he describes some cases of periodic neuralgia relieved by quinine and some by Fowler's solution.

of harmful effects from the use of large doses of quinine in suppressing malarial fevers. Giddiness, deafness, ringing in the ears and even temporary prostration were frequently experienced, but these were regarded as desirable symptoms, indicating that the remedy had been absorbed and was pervading the system with its antidotal influence. Nausea was sometimes produced, but was considered as of little moment in comparison with the great benefit to be derived from the administration. The absence of specially dangerous symptoms or undesirable sequelæ attributable to quinine might well be accepted, in view of its extensive employment during the war, as establishing the harmlessness of the remedy when exhibited in large doses in malarial fever.* It must be admitted, however, that large doses may be a source of danger by the direct sedative action of the drug on the nervous and circulatory systems, especially in cases having a tendency to heart-failure from temporary enfeeblement or degeneration of tissue. Dr. D. S. LAMB of the Surgeon General's Office, U. S. Army, published recently the case of a child of three years, in which, at the end of the first week of a mild attack of typhoid fever, death was caused in little over an hour by syncope following the ingestion of forty-two grains of quinine.† STILLÉ cites several cases of death from quinine, in which the autopsy showed congestion of the brain and lungs, and in some degree also of the stomach.‡ The toxical effects of quinine must therefore be held in view; and their notable absence from the records of the war be attributed to that judicious use of the remedy which relieved diseased conditions and even recovered the patient from impending death without injuring the system by an excess.

OTHER REMEDIAL AGENTS.—The sulphate of cinchonia was occasionally used during the war, but no systematic observations were made on its efficacy as compared with that of quinia. The opinion formed was unfavorable to its use. Surgeon MERRITT, for instance, states that he preferred quinine to cinchonine, but does not give the grounds of his preference. Certain experiments in this country, and recent observations in India, lead to the belief that cinchonia is energetic and in adequate doses a sure remedy.§ Nevertheless, from

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* The medical officers mentioned in note † p. 179, *supra*, were requested to testify on this subject. The 7th inquiry of General LAWSON'S Circular was as follows: "Since the practical introduction of quinine in large doses, the statistics of this bureau exhibit a much higher ratio of diseases of the bowels—as, for instance, diarrhœa and dysentery,—and also a much higher average of mortality from the same diseases. It remains therefore to be determined how far this result is due to this cause, or to the operation of other agents." In reply, Surgeon R. C. WOOD stated that—"I have always been opposed to the administration of quinine in very large doses, and have no doubt that dysentery and diarrhœa have been aggravated by the excessive use of this remedy." But the experience of the others did not sustain Dr. WOOD'S opinion. They attributed the increase in the bowel affections to the conditions existing during the Florida war, and conceived that quinine was efficient as a remedy in those diseases. Thus Surgeon R. S. SATTERLEE reported: "I have not the least hesitation in saying that the constant and long exposure of the soldiers in Florida to the influence of malaria, and their suffering from fevers, both remittent and intermittent, was the cause of the great mortality as well as the great number of cases of dysentery and diarrhœa that occurred there, and by no means the use of quinine; on the contrary, I have often seen intermittent and chronic dysentery, both in the same case, at the same time checked by that remedy." Assistant Surgeon B. M. BYRNE is the only officer who refers to other evil effects from the use of quinine: "I have, however, met with several cases of *nervous* affections, which evidently resulted from the administration of large quantities of this medicine. I have witnessed four cases in which partial deafness was experienced for upwards of three months; one in which the deafness was *permanent;* and one in which almost total blindness was occasioned for several days, and in which perfect vision was not restored for some months. These cases were all clearly attributable to the administration of quinine in large quantities. I have, besides these, met with numerous other cases of nervous derangement of a chronic character, such as slight spasmodic affections, frequent attacks of vertigo, palpitation of the heart, cephalalgias, nervous tremors, &c., which, it appeared to me, could be fairly ascribed to the same cause. In nearly all these cases the remedy had been exhibited in doses of from ten to thirty grains; and in several of them, as high as two hundred grains had been administered within ten days."

† *New York Med. Jour.*, Vol. XXXIX, 1884, p. 549.

‡ *Therapeutics and Materia Medica*, by ALFRED STILLÉ, M. D., Philadelphia, Pa., 1874, Vol. I, p. 206.

§ *Observations upon one hundred cases of intermittent fever in which the sulphate of Cinchonia was used as a substitute for quinia*, by A. PAUL TURNER, M. D., *Am. Jour. Med. Sciences;* New Series, Vol. XLVII, 1864, p. 396. DR. TURNER, after referring to MAGENDIE, GITTERMANN, CHOMEL and others who, after slight inquiry rejected the pretensions of cinchonia as a febrifuge, cites BALLY, who, in 1825, succeeded in immediately checking twenty-five out of twenty-seven intermittents, while the refractory cases yielded *on a* judicious perseverance in the remedy. He recalls the favorable opinions of MARIANI, WUTZER, DUFRESNE, POTIER and BARDSLEY, and invites special attention to Professor WILLIAM PEPPER'S success in promptly checking eleven out of fifteen cases, two of those remaining having yielded to a second administration of the remedy. Of his own cases seventy-nine had no paroxysm after the first exhibition of the medicine, fifteen had one paroxysm but not two, four had two but not more, one had three or more paroxysms, and in one the cinchonia, as administered, was without effect in averting the disease. The maximum quantity used during a single intermission was thirty grains, and the largest dose given at one time was fifteen grains. It was usually given in three-grain doses every hour during the intermission, until about twenty grains had been taken. Vertigo and buzzing in the ears were observed in most of the cases; nausea and vomiting occurred in five and cephalalgia in six. See, also, *Report of 57 cases of intermittent fever treated by the sulphate of cinchonia,*—J. C. WELLS,—*Cincinnati Med. Observer*, Vol. I, 1856, p. 15, and *Table of 102 cases of intermittent fever treated with the sulphate of cinchonia,*—G. MARTIN, in *Trans. College of Physicians*, Philadelphia, 1853–'56, Vol. II, pp. 434–436. JOSEPH DOUGALL, M. D.,

the slow progress made by this remedy into public favor, it seems unlikely that it will displace quinine as the special antidote to the poison of malarial fever.

The case-books of the Pettigrew hospital, Raleigh, N. C., Surgeon E. BURKE HAYWOOD in charge, give the details of the treatment of intermittents by turpentine applied to the chest over the fourth and fifth ribs. The application was made an hour before the accession of the cold stage, with a view to prevent the recurrence of the paroxysm. Mention has occasionally been made in the medical journals of the internal use of turpentine in intermittents;* but there are few references to its use as an external application. Nevertheless its employment in this way was advocated by some Southern practitioners, as appears from a letter written in 1855 by R. A. FONTAINE of Georgia,† in which he reports the successful treatment of an intermittent by anointing the entire chest, stomach and axillæ with turpentine, as recommended by J. C. NOTT of Mobile. Prior to its use at the Pettigrew hospital it had been employed at Savannah, Ga., in 1862, by STILES KENNEDY,‡ with very successful results. The patient was directed to appear at the steward's tent forty-five minutes before chill time, when a bandage of cotton cloth eight inches wide, soaked in turpentine, was wound around his chest; his linen was buttoned closely down over the bandage after which he was wrapped in a blanket and kept under medical supervision. At the time this practice was begun there were sixty-two intermittent cases on the register. Of this number fifty received immediate relief—that is, the expected paroxysm was suppressed: nine resulted in cure on the second application, and three on the third; but during these three days eight new cases were reported, all of which were cured on the first application. Fowler's solution was administered in each case to prevent relapse. In his subsequent experience Dr. KENNEDY found the turpentine a prompt and efficient remedy when used in this way. In some instances failure occurred from irregularity in the return of the chill, as when, by anticipating the period of its recurrence, no time was given for the preventive treatment by turpentine. In two cases of failure the oil made no impression on the skin, and in four or five cases remittent fever supervened.

It appears that the favorable results obtained by Surgeon KENNEDY, when reported to

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Surgeon MURRAY AYNSLIE.—*The febrifuge properties of the cinchona alkaloids—cinchonia, quinidia and cinchonidia.* *Edinburgh Med. Jour.* Vol. XIX, Part I, 1873, pp. 705-20. From observations on 466 intermittent cases Dr. AYNSLIE concludes that after quinine, quinidia is the most powerful as an antiperiodic, cinchonidia next to it, and cinchonia the least active; but that even cinchonia is energetic, and in adequate doses a sure remedy. In the first trials the alkaloids were given during the intermission. "Ere long they were given indiscriminately during paroxysm and intermission. At length it became manifest that they were most serviceable when administered during the paroxysm only." Head symptoms were less common than with quinine; but gastro-intestinal disturbances purging were frequent concomitants, the latter appearing to facilitate the cure. It does not appear from the history of the cases that emetics, purgatives or other evacuants were administered. The doses were usually five grains, with an occasional large dose of twelve grains. See also a *Report on the Statistical details of the treatment of six hundred cases, of malarious fever, in the Bhopal Battalion Hospital, by cinchona febrifuge or mixed alkaloids,* by J. DEVEAINE. *Indian Medical Gazette,* 1878, Vol. XIII, p. 69. The maximum quantity administered in twenty-four hours in any one case was twenty-one grains, which was usually given in three doses. The average quantity for all the cases from the commencement of treatment to discharge was 36.59 grains. The average number of days under treatment was thirty-three, the minimum one, and the average 4.55 days. Of the total 466 were quotidians, 76 tertians, 3 quartans and 3 remittents; and the average number of grains used in each case of the first variety was 37.26; of the second 33.58; of the third 45.66; of the fourth 30.00. But the administration was continued in the average in each case 1.87 days after the arrest of the paroxysm, and as for this protective purpose an average of 14.88 was used, the average quantity which sufficed to arrest the paroxysms amounted only to 21.71 grains. The proportion of the mixed alkaloids was estimated to contain only 1.35 grains of quinine; whence it was assumed that the combination of the alkaloids gave to the cinchona febrifuge the power of 13.53 grains of quinine. In 17 cases quotidian, tertian and remittent, the sulphate of quinine was given on the days of first transition, the cinchona febrifuge having been used on the days of apparent paroxysm. The mixed alkaloids did not cause nausea, vomiting or head symptoms in a larger number of cases than the sulphate of quinine. The writer's own experience of cinchonia is not so favorable as that noted above. In 1865 he supplied a detachment of troops at a remote station in the San Pedro bottom, Arizona Territory, with sulphate of cinchonia, in the absence of the quinia salt. The men, who were at first opposed to the use of the latter, pronounced against the new medicine as prone to cause vomiting and as being less efficacious than quinine.

* M. F. [illegible].—*Effects of Spirits of Turpentine in a case of intermittent.* *Boston Med. and Surg. Jour.*, 1828, Part 2, Vol. I, p. 712—gave two-thirds of a teaspoonful of turpentine in molasses at the beginning of the cold stage, which was immediately suspended; vomiting occurred, and the hot and sweating stages were but feebly marked. On subsequent occasions the remedy was followed by suppression of the paroxysms without nausea or other unpleasant result.

† *Southern Medical and Surgical Journal*, 1858-59, Vol. IV, p. 444.

‡ *Turpentine as a remedial agent* by STILES KENNEDY, M. D., of Hallstown, Del., in the *Med. and Surg. Reporter*, Philadelphia, 1867, Vol. XVI, p. 458: "As to the mode of using the oil of turpentine, I submit, 1st. The pain produced by it calls the whole attention of the mind. 2d. The impression on the nervous centres, viz. The diminished chill." Mustard was frequently used by Dr. KENNEDY, but he found that the skin became sore, swollen and painful, while the turpentine produced no such unfavorable results.

the Surgeon General, C. S. A., led to a series of experiments on this mode of treatment in several sections of the Confederacy. Seven cases were reported in the *Confederate States Medical and Surgical Journal*, January 7, 1864;* in these the expected accession was prevented, but the chill recurred on the seventh or fourteenth day. The *Journal*, the official organ of the Surgeon General, expressed a desire for a larger experience of this economical method of treatment, and requested that reports of cases be promptly forwarded. In response to this, seventy returns, involving over 400 cases, were received from different hospitals and posts, and the announcement was made that with few exceptions the remedy was regarded by the reporters as one of great power, if not positive efficiency, in preventing a return of the paroxysm. Nevertheless, in a later issue† the editor hesitated to accept these favorable experiences, considering that the turpentine had no special advantage over other powerful revulsives, such as blisters, alcoholic stimulants, narcotic medicines, sudden shock as from a plunge in cold water, exciting news, etc., which sometimes stave off chills, although they are seldom used for this purpose therapeutically. The results at the Pettigrew hospital were not so satisfactory as those reported by KENNEDY; but whether this was owing to the smaller surface exposed to the action of the turpentine or to a difference in the character of the cases is unknown; certainly in many instances the failure was not due to irregularities in the type of the disease. A report from the Chimborazo hospital, Richmond, Va., shows that this mode of treatment was employed in its wards, and proved successful in some cases, although in many others it merely retarded the access.

At the Pettigrew hospital there was also tried a mixture of tincture of opium‡ and solution of ammonia as a substitute for quinine in the treatment of intermittent fevers. A draught containing thirty drops of each was given a short time before the expected onset. Of thirty-three cases detailed below thirteen were treated by turpentine applied by means of a roller bandage around the chest; *one* of these was successful on the first application:

CASE 1.—Private J. B. Kelly, Co. F, 50th N. C., had a quotidian chill Nov. 7, 1864, at 8 p. m. Next day at 7 P. M. the roller was applied for an hour, and there was no chill. The operation was repeated on the 9th and 10th, and there was no recurrence of the chill. Three ounces of turpentine were used without injury. He was returned to duty on the 28th.

Three were successful on the second application:

CASE 2.—Private D. D. Stubbs, Co. F, 21st S. C., had a quotidian chill June 28, 1864, at 3 P. M. At 1.30 P. M. the next day turpentine on a roller bandage was applied and continued for three hours. The chill however recurred. The application was repeated on the following day, and the chill was suppressed. No strangury or injury to the tissues resulted. Three ounces of turpentine were used.

CASE 3.—Private M. B. Manners, Co. K, 10th N. C., had a tertian chill Sept. 7, 1864, at 7.30 A. M. The application was made on the 9th at 5.30 A. M. and continued for two hours. A slight chill occurred; but after a second application there was no recurrence. No injury to the tissues or other bad effect followed. Two ounces of turpentine were used.

CASE 4.—Private M. Steen, Co. A, 13th Art'y Batt., had a quotidian chill Sept. 19, 1864, at 11 A. M. At 10 A. M. next day the application was made and continued an hour without success; but after the repetition of the application on the 21st there was no chill. Five ounces of turpentine were used.

One on the third application:

CASE 5.—Private C. M. Dowd, Co. H, 1st Junior Reserves, had a tertian chill Sept. 20, 1864, at 3 P. M. On the 22d at 2 P. M. the application was made and continued for one hour; it was repeated on the 24th, with partial success. The chill recurred on the 26th. The application was renewed, and there was no chill thereafter. Six ounces of turpentine were used.

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* *Confederate States Med. and Surg. Journal*, Richmond, 1864, Vol. I, p. 7:—*On the external application of the oil of turpentine as a substitute for quinine in intermittent fever, with report of cases.*

† *Op. cit.*, last note, *Editorial*, p. 119.

‡ Opium has been frequently used in conjunction with quinine to relieve the patient from the head symptoms occasionally produced by the latter, to restrain the bowels when diarrhœa or dysentery accompanied malarial fever, or, as we have already seen, to allay gastric irritability which might threaten the rejection of quinine. But it has sometimes been used alone, as for instance: *Eight cases of simple intermittent and six of remittent fever successfully treated by the exhibition of partially denarcotized opium.*—W. S. SINN of Chill, Hancock, Ill.—*Nashville Med. Jour.*, 1854, Vol. VII, p. 379.

While in *eight* it was found advisable to have recourse to quinine:

CASE 6.—Private H. L. Lawson, Co. I, 18th S. C., had a tertian chill at noon of June 8, 1864. On the 10th at 11 A. M. a roller bandage wet with turpentine was applied and continued for three hours. The chill, however, continued to recur every second day. The amount of turpentine used was ten ounces. No injury to the tissues or strangury occurred. He was finally treated with quinine.

CASE 7.—Private D. W Greenlee, Co. K, 50th N. C., had a quotidian chill Nov. 8, 1864, at 6 A. M. Next day at 5 A. M. the roller was applied for an hour and no chill occurred. On the 10th a chill occurred at 2 A. M. Quinine was administered on the 11th and 12th, and there was no recurrence of chills. He was anæmic, and was therefore given tincture of iron and infusion of quassia. Two ounces of turpentine. He was returned to duty on the 27th.

CASE 8.—Private B. J. Pollard, Co. D, 50th N. C., had a quotidian chill Nov. 7, 1864, at 9 A. M. Next day at 8 A. M. the roller was applied for one hour, and repeated on the 9th, and no chill occurred. On the 10th the roller was not applied, and a chill occurred at 10.30 A. M. He was then given quinine until the paroxysms ceased, and was continued on tonic treatment for debility. Two ounces of turpentine were used. He was furloughed on the 14th for sixty days.

CASE 9.—Private T. J. Turner, Co. F, 50th N. C., had a quotidian chill Nov. 7, 1864, at 2.30 P. M. The paroxysms were so irregular that the roller was applied but once, on the 9th at 11 A. M., for one hour, one ounce of turpentine being used. A chill had occurred on the 8th at 12.30 P. M., and recurred on the 9th at 3 P. M. Quinine was then used and the paroxysms ceased. He remained under treatment for diarrhœa.

CASE 10.—Private H. W. Canisse, Co. G, 50th N. C., had a quotidian chill Nov. 8, 1864, at 2 A. M. On the 9th at 1 A. M. the roller was applied for an hour. At 1 P. M. the chill recurred. The operation was repeated at noon on the 10th, but a chill occurred at 10 P. M. Two ounces of turpentine were used. On account of the irregularity of the chills, quinine was given, three grains every two hours, and a cure effected. He was retained on tonic treatment because of debility following intermittent fever.

CASE 11.—Private J. C. Hutchings, Co. G, 50th N. C., had a quotidian chill Nov. 7, 1864, at 11 A. M. The chill recurred irregularly. The first application was on the 8th, at 10 A. M., for an hour. He was treated in the same manner as Canisse. Two ounces of turpentine were used. He continued in the hospital taking tonics for debility.

CASE 12.—Private G. L. Black, Co. G, 50th N. C., had a tertian chill Nov. 8, 1864, at 1 P. M. A quotidian character was afterwards assumed. The roller was applied on the 10th and 11th for two hours, without success. Two ounces of turpentine were used. Quinine was then resorted to. He remained under treatment for debility.

CASE 13.—Private J. C. Strickland, Co. D, 11th S. C., had a quotidian chill Oct. 8, 1864, at 10 A. M. Next day at 9.30 A. M. the roller was applied for half an hour. A chill, however, occurred. The application was repeated on the 10th and no chill occurred. Next day he had fever, which continued several days. He was given quinine, two grains every three hours, and the paroxysms were finally checked. On the 18th a chill occurred at 9 P. M. The roller was applied at 8.30 P. M. on the 19th, 20th and 21st, without success, but on the 22d the chill was arrested and did not recur. Eight ounces of turpentine were used without any injurious effects.

Of the twenty remaining cases *one* was treated successfully by turpentine with the subsequent addition of opium and ammonia:

CASE 14.—Private R. Clarke, Co. D, 9th Pa. Reserves, had a quotidian chill Nov. 9, 1864, at 10 A. M. Next day at 9 A. M. the roller was applied for an hour, and there was no chill. On the 11th laudanum and ammonia were used in addition to the roller. No chill occurred. Having chronic diarrhœa he was retained in the hospital. Two ounces of turpentine were used.

Two were treated with success by opium and ammonia without the use of the turpentine bandage:

CASE 15.—Private Jacob W. Cobb, Co. H, Bonaud's Georgia battery, had a chill June 6, 1864, at 6 P. M. Next day at 5.30 P. M. laudanum and solution of ammonia, of each thirty drops, were given. The chill did not recur. The dose was repeated on the 8th, and there was no further recurrence of chill. A tablespoonful of infusion of dogwood was given every three hours through the day. He was returned to duty, cured, on the 16th.

CASE 16.—Private G. G. Davis, Co. H, Bonaud's Georgia battery, had a chill June 6, 1864, at noon. The next day at 11 A. M. thirty drops each of laudanum and solution of ammonia were given, and the chill did not return. Infusion of dogwood was administered every three hours.

Six were treated at first with the turpentine bandage; but the chills persisting, opium and ammonia were resorted to with beneficial results:

CASE 17.—Private J. B. Woodliss, Co. E, 1st N. C. Cav., had a quotidian chill Oct. 2, 1864, at 1 P. M. Next day at noon the usual application was made and continued for one hour; but the chill recurred. On the 4th the operation was repeated and laudanum and ammonia in the usual dose administered, after which the chill did not recur. There were no injurious effects from the turpentine, two ounces of which were used. He was returned to duty on the 15th.

CASE 18.—Private George W. Thompson, Co. F, 2d Junior Reserves, had a tertian chill Oct. 15, 1864, at 8 A. M. On the 17th at 7 A. M. the roller was applied and continued for an hour. On the 19th a chill occurred. The roller was repeated and laudanum and ammonia administered. No further chills occurred. Two ounces of turpentine were used, without injurious effect. He was returned to duty on the 24th.

CASE 19.—Private Wm. S. Davis, Co. G, 50th N. C., had a quotidian chill Nov. 10, 1864, at 11.30 A. M. Next day at 10.30 A. M. the roller was applied for one hour over the fifth and sixth ribs, and was repeated on the 12th

without success. On the 13th laudanum and ammonia were administered, after which there was no recurrence of chill. Three ounces of turpentine were used without injury. He was returned to duty on the 30th.

CASE 20.—Private G. W. Wren, Co. A, 50th N. C., had a quotidian chill Nov. 7, 1864, at noon. Next day at 11 A. M. the roller was applied for an hour. A slight chill occurred. The same treatment was pursued on the 9th and 10th, a chill occurring each day. On the 11th laudanum and ammonia were added. There were no further chills. Four ounces of turpentine were used. He was treated for anæmia with muriate of iron and infusion of quassia.

CASE 21.—Private J. C. Snead, Co. A, 13th N. C. Art'y, had a quotidian chill Sept. 20, 1864, at 1 P. M. The roller was applied at noon and continued for an hour. It was repeated thus for four consecutive days, but without preventing the recurrence of the chill. On the 24th laudanum and ammonia, of each thirty drops, were given while the bandage was on. A slight chill occurred. On the 25th this treatment was repeated, and there were no chills afterwards. Ten ounces of turpentine were used. Oct. 14, at 5 A. M. he had a tertian chill. On the 16th at 4 A. M. the application was made and continued for one hour; at the same time laudanum and ammonia were given. No chill occurred thereafter. One ounce of turpentine was used. He was returned to duty on the 19th.

CASE 22.—Private W. P. Wilson, Co. I, 1st N. C. Reserves, had a quotidian chill Sept. 20, 1864, at 2 P. M. Next day at 1 P. M. the application was made for one hour, and repeated daily till the 24th, without success. On the latter date the usual dose of laudanum and ammonia was given, and the chill did not occur. This treatment was repeated the next day, and there was no chill afterwards. Ten ounces of turpentine were used.

In *five* cases treated by turpentine externally, in conjunction with opium and ammonia internally, four were successful on the first day and one on the second day:

CASE 23.—Private W. H. Roberts, Co. D, 20th Ga. battery, had a tertian chill Aug. 31, 1864, at 10 A. M. At 9.30 A. M., Sept. 2, the roller was applied for an hour over the fourth and fifth ribs, and at the same time were given laudanum and solution of ammonia, of each thirty drops. The chill did not recur. The roller and the laudanum and ammonia were repeated on the 4th. No further chills occurred. There was no injury to the tissues nor other bad effect from the turpentine. The amount used was ten ounces. He was returned to duty on the 23d.

CASE 24.—Private James R. Dean, Co. B, 1st Junior Reserves, had a quotidian chill Oct. 24, 1864, at 3 P. M. Next day at 2 P. M. the roller was applied for an hour, with the laudanum and ammonia internally. The chill did not recur. The same treatment was repeated on the 26th, and there were no chills afterwards. Two ounces of turpentine were used. He was furloughed on the 29th.

CASE 25.—Private J. S. Tribble, Co. B, 8th Georgia, had a tertian chill Oct. 2, 1864, at 6 P. M. On the 4th at 5 P. M. the roller was used for one hour, in connection with the laudanum and ammonia. The chill did not recur. One ounce of turpentine was used. He was much debilitated from diarrhœa.

CASE 26.—Private J. M. Wilson, Co. H, 50th N. C., had a quotidian chill Oct. 3, 1864, at 2 P. M. Next day at 1.30 P. M. the roller was applied for half an hour, and laudanum and ammonia used. There was no chill. The treatment was repeated at the end of the week, and there was no recurrence of chill. One ounce of turpentine was used. As he was anæmic he was given Vallet's mass and quinine for a week. On the 20th he was returned to duty.

CASE 27.—Private John Broadbent, Chappell's Train Guard, had a quotidian chill Oct. 2, 1864, at 3 A. M. Next day at 2.30 A. M. the roller was applied for half an hour without, however, preventing a chill. Laudanum and ammonia were also used. On the 4th the treatment was repeated, and there was no chill. No injurious effect followed the use of the turpentine, of which two ounces were used. He was returned to duty on the 18th.

And in *six* recourse was had to quinine after a conjoint trial of the new methods:

CASE 28.—Private J. S. Inge, Chapman's Guard, had a quotidian chill Oct. 1, 1864, at noon. At 11.30 A. M. next day the roller was applied for half an hour, in connection with laudanum and ammonia internally: a chill occurred. Next day it was developed an hour earlier. On the 4th it occurred at 10 A. M.; the treatment having been commenced at 9 A. M. 5th, The chill occurred at 10 A. M.; treatment repeated. 6th, The chill, which was less severe, occurred at 10.30 A. M., the same treatment having been pursued. 7th, The laudanum and ammonia were omitted. The chill began at 11 A. M. and receded half an hour daily until the 10th. On that day fifteen grains of quinine were given but without success. Next day three grains every two hours were given until eighteen grains had been taken, and there was no chill. Smaller doses of quinine were used until the 15th; no chill. Twelve ounces of turpentine were used without injury to the tissues. He was returned to duty on the 18th.

CASE 29.—Private J. G. Stephenson, Co. D, 50th N. C., had a quotidian chill Nov. 7, 1864, at noon. Next day at 11 A. M. the roller was applied for an hour, and the chill did not recur. On the 9th the application was repeated. There was no chill, but some fever. A chill occurred on the 10th. The application was repeated at 10.30 A. M. of the 11th, and at the same time laudanum and ammonia were given, but without success. 12th, Two grains of quinine every two hours were given. A chill occurred. 13th, The treatment was repeated and no chill occurred. Four ounces of turpentine were used without injury. He remained anæmic for some time, and was given infusion of quassia one ounce three times daily; 23d, he was returned to duty.

CASE 30.—Private J. D. Woodall, Co. C, 50th N. C., had a quotidian chill Nov. 7, 1864, at 4 P. M. At 3 P. M. the next day the roller was applied for two hours, but the chill occurred at 9 P. M. On the 9th the application was made at 5 P. M.; there was slight fever afterwards. On the 10th the treatment was repeated, but the chill occurred, receding three hours. 11th, Laudanum and ammonia were added, but without effect. 12th, Quinine was given, and there was no chill. He was anæmic, and was retained in hospital. Five ounces of turpentine were used.

CASE 31.—Private S. Laws, Co. I, 1st N. C. battery, had a quotidian chill Nov. 7, 1864, at 9 P. M. Next day at 8 P. M. the roller was applied for one hour, but the chill occurred at 11 P. M. On the 9th and 10th this treatment was

repeated without preventing the chill. 11th. Laudanum and ammonia were added without effect. On the 12th and 13th quinine was employed, and no chill occurred. Four ounces of turpentine were used without injury. As he was anæmic tincture of muriate of iron, twenty drops three times daily, was given.

Case 32.—Private William Huntingdon, Co. I, 50th N. C., had a quotidian chill Nov. 7, 1864, at 10 A. M. The next day at 9.30 A. M. the roller was applied for one hour. The treatment and results were as in the case of Lamb. Four ounces of turpentine were used. He was returned to duty on the 27th.

Case 33.—Private A. Britt, Co. D, 50th N. C., had a quotidian chill Nov. 7, 1864, at 1 P. M. At noon next day the roller was applied for an hour and there was no chill. On the 9th and 10th the application was repeated, and a chill occurred each day. 11th, Laudanum and ammonia were added to the other treatment, but without avail. On the 12th and 13th quinine was used. An infusion of quassia and muriate three times daily, was given for seven days. Three ounces of turpentine were used without injury. He was returned to duty on the 20th.

In addition to these the records of the Pettigrew hospital state that—

A number of cases were treated with the turpentine roller as an adjuvant to quinine, greatly reducing the quantity of the latter administered.

The following is from the case-book of the Chimborazo hospital, Richmond, Va.; the writer's name is not given:

Intermittent fever, the common ague of this country, has been quite prevalent this winter, and quinine, almost the only remedy employed against it internally, has not prevented relapses. The turpentine stupe has proved useful in some cases, applied an hour before the expected paroxysm, but in many others it has only retarded the access of the paroxysm. The acetates, citrates and tartrates of soda or potash, so highly commended as adjuvants to the antiperiodic treatment by Golding Bird, have not been employed, and has sufficient experience failed to repeat the antiperiodic remedy, whether quinine, arsenic or other, at intervals of seven days. The individual cases have presented no points of particular interest except that of Pitts, who died of the congestive or pernicious form. He was a fine, tall, robust fellow, recently from the Army of Virginia. He was received into hospital on admission, and though without typhoid symptoms, gave the idea of a profound cerebral impression. Two evenings he was seized with what was spoken of as convulsive movements, quite violent, during which he struck to the right and left and had to be held by main force: it was supposed that he sought to jump out of the window. The paroxysmal delirium was succeeded by intense fever. After a few nights he became very wild at the hearing access and shook violently. During the intervals he remained taciturn and did not seem to recognize his friends. The treatment employed was insignificant. A few small doses of quinine, cupping to the temples, a blister to the nucha, etc. Nothing made any impression, and he died within a week.

The prevalence of malarial diseases in the Confederate Armies, together with the scarcity of quinine resulting from the blockade of the Southern ports, gave origin to a continued effort to utilize such indigenous remedies as were popularly credited with antiperiodic powers. In fact, in the first year of the war Dr. Joseph Jones called attention to the advisability of investigating the properties of native plants with a view to finding a substitute for quinine.* Of these the *Pinckneya pubens* of Georgia [illegible] and the *Cornus florida* or dogwood, had an extensive trial. The former is a small tree closely allied to the cinchonas, growing on the wet and boggy margins of the streams which intersect the pine barrens from New River, S. C., to Florida. Dr. Jones reports it as having been used in conjunction with dogwood and wild cherry as a tonic and antiperiodic. In view of its reputed virtues the Surgeon General, C. S. A., directed his medical purveyor to have it collected for experiment. The only published report on its use, that rendered by Medical Director A. M. Fauntleroy, does not sustain its claim for notable febrifuge powers.†

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* *Intramuscular remedies of the Southern troops*, [illegible] Surgeons and Physicians, Surgeon-General's Office, 1864, Vol. XVII, pp. 673 and 753. In this paper Dr. Jones insists on the examination and employment of Southern remedies, not as a temporary expedient in the absence of quinine, but as permanently valuable. He discusses the various remedies which may be employed in the treatment of the most common and important of Southern diseases, citing the evidence on which the reputation of each has been established. As of value in malarial fevers, the following remedial means and measures are discussed: The inner bark of the *Pinckneya pubens*, or the rose bark; the bark of the root, stem and branches of *Cornus florida* or dogwood; the bark of other species of dogwood, as *C. circinata*, the round-leaved dogwood, and *C. sericea*, the swamp dogwood; the bark of the poplar or tulip-tree, *Liriodendron tulipifera*; the bark of certain magnolias, as the small magnolia or sweet bay, *Magnolia glauca*; the cucumber tree, *M. acuminata*; big laurel, *M. grandiflora*, and umbrella tree, *M. tripetala*; the bark of the persimmon, *Diospyros Virginiana*; the bark of the catalpa, *Bignonia catalpa*; Virginia snake-root, *Aristolochia serpentaria*; Indian quinine or ague weed, *Gentiana quinquefolia*; thoroughwort, boneset or Indian sage, *Eupatorium perfoliatum* and wild horehound, *E. rotundifolium*; willow bark, *Salix alba* and *S. nigra*; the root of the yellow jessamine, *Gelsemium sempervirens*; the root of milkweed, *Asclepias syriaca*; chloride of sodium; hydrochlorate of ammonia; nitrate of potash; arsenic; ligature of the extremities and cold affusions and douches.

† A. M. Fauntleroy, Medical Inspector, Wilmington, N. C.—*Report of additional cases of febris intermittens treated with the extract of Pinckneya pubens.* Confederate States Medical and Surgical Journal, Vol. I, p. 134—concludes thus: "The extract has undoubted antiperiodic properties: still it is too slow in its action to be used as a substitute for the sulphate of quinine." [illegible] complains strongly [illegible] Impressions. In intermittent [illegible]

The *Cornus florida*, a small tree common on moist gravelly soils in the Northern and Middle States and along the borders of swamps and bottom lands in the South, was also employed under official auspices.* Dr. JONES says he used the decoction and tincture to a considerable extent during the war, and found the remedy of value in the treatment of malarial fever. In severe cases the paroxysm was arrested by quinine and the treatment subsequently continued with dogwood. Its use is incidentally mentioned in some of the cases given above from the records of the Pettigrew hospital. But it does not appear that any formal reports testifying to its efficacy were rendered; for as these were requested by the medical authorities, it may be assumed that, had any such been returned, they would undoubtedly have been published. The medical journals are also silent on the subject. We may therefore conclude, with Dr. KENNEDY, that although the dogwood and other bitter infusions furnished by the Confederate States Army Medical Purveying Department possessed an antiperiodic power which, under favorable conditions, would cure ague, there were certain objections to their use, and in no case could they be valued as a substitute for quinine.†

CHAPTER IV.—ON THE CONTINUED FEVERS.

I.—THE STATISTICS OF THE CONTINUED FEVERS.

I.—IN THE UNITED STATES ARMIES.

PREVALENCE AND MORTALITY.—The uncertainties attaching to the statistics of the Camp Fevers from the abolition of the term *common continued fever*, and the institution of the new term *typho-malarial*, have already been indicated.‡ The figures representing the typhoid cases of the later years do not comprise the whole of the cases that occurred in the commands from which they were reported, for some were certainly included in the typho-malarial statistics. Indeed, in accordance with the intent of the new term, each case reported under it should have been essentially a typhoid case. But a comparison of the rates of fatality of the two series of cases manifests that in its acceptance by the profession the new term had a more extended signification than was purposed by its author. The percentage of deaths in typhoid cases among the white troops was 35.90, among the colored troops

is principally that of a tonic, and it deserves a position in the front rank of vegetable tonics. From the tardiness of its action, and its effect upon the vascular system, together with its manifest invigoration of the digestive organs, I am induced to think its energy as an agent is displayed through the organic nervous system."

*A circular from the Surgeon General's Office, C. S. A., dated Dec. 5, 1862, printed by JONES in his article on *Indigenous Remedies of the Southern States—St. Louis Medical Reporter*, 1868, Vol. III, p. 261 *et seq.*—gives a formula "for a compound tincture of the indigenous barks, to be issued as a tonic and a febrifuge, and substituted, as far as practicable, for quinine. * * * Dried dogwood bark, 30 parts; dried poplar bark, 30 parts; dried willow bark, 40 parts; whiskey 45 degrees strength. Two pounds of the mixed bark to one gallon whiskey. Macerate fourteen days and strain. Dose, one fluid ounce three times a day."

†Dr. STILES KENNEDY gives his opinion of these indigenous remedies incidentally in introducing the subject of turpentine externally applied. See note *supra*: "While in Savannah, November, 1862, I assumed control of the medical department of the 47th Georgia regiment in order that its surgeon might visit his sick wife in Griffin. Several companies of this regiment had been exposed during the summer months to the effluvia of the rice fields on the Savannah river, and at first 'sick-call' I found over one hundred cases of 'chills.' No quinine was being issued at this time by the Confederate purveyor, but instead of this potent remedy, infusion of *Pinckneya pubens*. Spanish willow and dogwood were sent in large quantities with full directions for their use, and the hope was expressed that I would be able to return a favorable report of their effects. And I will state here, that when the patient is in comfortable quarters in town, away from exposure and malarial influences, with sufficient tone and calibre of stomach to bear repeated drenchings of these nasty infusions, there is no difficulty in curing intermittent fever. But my troops were in the field and on picket-duty every day. * * * The infusions failed during a severe trial."

‡ *Supra*, p. 75 *et seq.*

55.69, while in typho-malarial cases the corresponding rates were 8.14 and 17.27. During the fourteen months, July, 1862, to August, 1863, inclusive, following the introduction of the term, and while yet in ignorance of the value intended to be officially attached to it, medical officers of white troops reported 27,399 cases, or more than one-half of the total number of cases, 49,871, embraced in the statistics: of these only 1,585 died, or 5.08 per cent. Had enteric fever been assuredly present in all these cases a further deterioration of the blood by a coincident malarial fever must be regarded as a desirable complication in typhoid epidemics. But, after the public announcement of the intent of the term, the suddenly increased gravity of the cases reported under it must be understood as meaning that a certain proportion of the medical officers of the army became aware of the value intended to be attached to *typho-malarial*, and restricted its use accordingly to cases which appeared to them to present a specific typhoid element. The 22,472 cases reported subsequently to August, 1863, included 2,474 fatal cases, the percentage of fatality being 11.01. The probable proportion of true typhoid cases embraced by the typho-malarial statistics will be suggested hereafter when the clinical and pathological features of the cases thus reported have been submitted and fully considered.* But although the whole of the typho-malarial cases were not typhoid fevers modified by coexisting malarial influences, they were probably all of a more or less continued type: and while their statistics have been presented in connection with the paroxysmal fevers in view of their malarial element, it seems proper to again submit them in the present connection in view of their continued, if not in all cases truly typhoid, character.

The following table summarises the reported statistical facts:

TABLE XXXIX.

Statement of the Frequency and Fatality of the Continued Fevers, giving the totals reported from May 1, 1861, to June 30, 1866, among the White Troops, and from July 1, 1863, to June 30, 1866, among the Colored Troops; with the ratio of cases to strength and to cases of all diseases, and the ratio of deaths to strength, to deaths from all diseases, and to cases of the continued fevers.

SPECIFIED FEVERS.	Number reported during the period stated.		Ratio per 1,000 of strength.		Cases per 1,000 of cases of all diseases.	Deaths per 1,000 deaths from all diseases.	Deaths per 100 cases.
	Cases.	Deaths.	Cases.	Deaths.			
Among White Troops from May 1, 1861, to June 30, 1866:							
Typhoid Fever	35,368	27,650	175	17.78	16.40	200.31	18.30
Common Continued Fever	11,488	147	28	.36	2.36	1.34	1.28
Typhus Fever	2,504	80	6	1.82	.62	0.67	3.19
Typho-Malarial Fever	49,871	4,059	127	8.47	8.19	93.87	8.14
Total	129,228	32,134	324	28.78	27.74	448.19	25.00
Among Colored Troops from July 1, 1863, to June 30, 1866:							
Typhoid Fever	4,094	2,280	47	26.42	3.77	82.61	57.00
Typhus Fever	128	108	1	1.09	.12	3.91	87.50
Typho-Malarial Fever	7,529	1,301	123	21.26	15.44	47.13	17.27
Total	11,740	3,689	191	59.77	19.33	133.65	31.42

* See *infra*, p. 375.

Among the white troops there were reported 139,638 cases of the fevers specified, and of these 32,112 were fatal, making 324.0 cases and 68.58 deaths per thousand of strength present during the five and one-sixth years covered by the statistics. Although the cases formed only about one-fortieth of the total cases of disease, 25.74 per thousand, their fatality was such that the deaths constituted one fourth of the deaths from all diseases, or 248.19 per thousand. This was due to the relatively large proportion and grave character of the typhoid cases. The percentage of fatal cases among those reported as typhus was large, 33.99, but the number of cases being comparatively small, this fever was charged with only 6.57 of the 248.19 deaths from continued fevers presented by every thousand deaths from all diseases. The cases of typho-malarial fever, on the other hand, assumed an importance from their number, although they furnished only 31.37 deaths as compared with 209.11 caused by typhoid in every thousand deaths from disease.

Among the colored troops nearly two-thirds of the total number, 11,746, of cases of continued fever were reported as typho-malarial fever. The ratio of typho-malarial to typhoid cases among the white troops cannot be obtained from the upper division of the table, as the periods during which the cases occurred were of unequal duration. But a

TABLE XL.

Expressing the Frequency and Mortality of the reported forms of the Continued Fevers as percentages of the total cases and deaths caused by such fevers.

WHITE TROOPS.

SPECIFIED FEVERS.	Total number of cases.	Total number of deaths.	PERCENTAGE OF— Cases of specified fevers in total of febrile cases.	PERCENTAGE OF— Deaths from specified fevers in total deaths from all the forms.
May 1, 1861, to June 30, 1862—				
Typhoid Fever	22,062	5,365	63.4	94.2
Typhus Fever	841	204	2.4	3.4
Common Continued Fever	11,898	147	34.2	2.4
Total of specified forms	34,801	6,016	100.0	100.0
July 1, 1862, to June 30, 1866—				
Typhoid Fever	53,306	21,391	50.8	82.9
Typhus Fever	1,660	640	1.6	2.5
Typho-malarial Fever	49,871	4,050	47.6	15.5
Total of specified forms	104,837	26,096	100.0	100.0

COLORED TROOPS.

July 1, 1863, to June 30, 1866—				
Typhoid Fever	4,094	2,280	34.9	61.8
Typhus Fever	123	108	1.0	2.9
Typho-malarial Fever	7,529	1,301	64.1	35.2
Total of specified forms	11,746	3,689	100.0	100.0

reference to Table XL, on the opposite page, will show that during the three years in which both typho-malarial and typhoid cases were reported the former constituted less than one-half of the total. It will be seen hereafter that this greater prevalence of typho-malarial fever among the colored troops was associated with a diminished prevalence of typhoid, the average annual number of cases of continued fever among them having been nearly the same as among the white commands. Hence the deaths from typho-malarial fever constituted a larger proportion of the deaths from continued fever, and of the deaths from all causes, among the negroes than among the whites, and the deaths from typhoid fever a smaller proportion, although the percentage of cases that terminated fatally was considerably greater among the former than among the latter. It will be observed also that among the colored troops the deaths from the continued fevers constituted a smaller proportion of the deaths from disease, 134.15 per thousand, than among the whites, 248.19 per thousand, notwithstanding the similar rates of prevalence among both and the larger rate of mortality among the negroes. This may be seen, by Table II,* to have been caused by the relatively greater mortality from diseases of the respiratory organs.

During the period when common continued fever held a place in the official nosological system, typhoid cases formed 63.4 per cent. of the continued fevers among the white troops, typhus 2.4 and common continued fever 34.2 per cent.,† while typhoid was charged with 94.2 per cent. of the deaths; subsequent to that period typhoid contributed a little more and typho-malarial a little less than one-half of the cases, typhus forming only 1.6 per cent., while the deaths attributed to typhoid were reduced to 82.0 per cent. of those from the continued fevers by the substitution of the larger percentage from typho-malarial fever for the smaller percentage formerly referred to common continued fever.

Among the colored troops 54.1 per cent. of the febrile cases were reported typho-

Table XLI.

Relative Frequency of Cases of the Continued Fevers, and of Deaths occasioned by them, during the several years of the war and the year following the war, expressed in annual rates per thousand of strength present.

WHITE TROOPS.

Diseases.	1861–2.		1862–3.		1863–4.		1864–5.		1865–6.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Typhoid Fever	74.00	2.46	78.62	19.55	52.36	15.89	16.06	6.63	12.97	6.23
Typhus Fever	2.80	.91	2.94	.69	1.55	.57	.70	.18	.32	.21
Common Continued Fever	38.40	.....	42.13	.51	.....	.....	.....	.....	.....	.....
Typho-malarial Fever	.....	.....	.....	.....	38.60	1.78	18.36	1.71	22.61	2.27	16.62	2.54
Total Continued Fevers	115.20	3.37	123.69	20.75	92.51	18.24	35.12	8.52	40.44	11.45	29.91	8.98

COLORED TROOPS.

Typhoid Fever	.....	.....	.....	.....	.....	.....	45.07	16.36	20.24	15.64	9.74	5.59
Typhus Fever	.....	.....	.....	.....	.....	.....	1.39	1.20	.73	.46	.13	.12
Typho-malarial Fever	.....	.....	.....	.....	.....	.....	96.10	20.86	97.47	5.51	34.21	5.49
Total Continued Fevers	.....	.....	.....	.....	.....	.....	92.56	38.42	118.44	21.61	44.08	11.20

* Page 11, ante.

† The relative frequency of the typhoid fever and typho-malarial fever is discussed in detail in Table XLVII.

malarial, 31.9 typhoid and 1.0 typhus, while the deaths under these headings were respectively 35.2, 61.8 and 2.9 per cent. of the whole number attributed to these fevers.

Table XLI, presented on the last page, shows the annual variations in prevalence and mortality. The columns for 1860–61 may be overlooked, as their figures are based only on the reports for the last two months of the fiscal year.

As the war progressed these fevers became less frequent among the white troops. The first year gave 123.69 cases per thousand of strength; the last year of the record gave only 29.91. But this decline suffered, in 1864–65, a slight interruption, specially marked among the typho-malarial cases, and probably due to the substitution of fresh troops for men who withdrew to their homes on the expiration of their term of service. The death-rate was similarly interrupted in its fall from 20.75 to 8.98 per thousand of strength.

No interference occurred in the gradual subsidence of these fevers among the colored troops from a rate of 99.39 per thousand strength in the first year to 44.08 in the last, nor in the fall of the mortality-rate from 28.50 to 11.60.

But although the annual mortality expressed as a ratio of the strength present diminished with the reduction in the number of the cases, the decrease of the one was not exactly proportioned to the other. Nor was this disproportion due to the association of lessened virulence with diminished prevalence. On the contrary, the gravity of the cases increased to the close of the war. During the first complete fiscal year 17.4 per cent. of the febrile cases among the white troops terminated fatally; during the last year 31.8 per cent.; during the year following the war 30.9 per cent. Table XLII illustrates the increasing gravity of the individual cases during annual periods which, according to Table XLI, were characterized by a diminution of the prevalence of these fevers and of the mortality caused by them in the army as a whole.

Table XLII.

Showing the Annual Percentages of Fatality of the Continued Fevers.

WHITE TROOPS.

Year ending June 30—	1861.	1862.	1863.	1864.	1865.	1866.	Rates for the whole period.
Typhoid Fever	17.5	25.7	32.6	14.2	59.5	49.4	35.30
Typhus Fever	15.0	24.5	39.7	35.2	37.8	67.8	33.99
Common Continued Fever	0.0	1.2					1.24
Typho-malarial Fever			5.0	9.9	11.2	15.7	8.14
Total	8.1	17.4	21.3	25.9	31.8	30.9	23.00

COLORED TROOPS.

Typhoid Fever				49.3	70.3	63.2	55.69
Typhus Fever				85.7	89.1	100.0	87.80
Typho-malarial Fever				19.9	15.7	16.5	17.27
Total				29.5	35.3	27.1	31.41

The rates here presented cannot be accepted as accurate. The want of relation between the cases and deaths borne on the reports has already been explained. The cases that occurred in the large population of the general hospitals were not taken up on the

reports, but all the deaths were noted. The mortality among this unknown number of cases adds considerably to the calculated rates of fatality. The limits of the error may be fairly defined for certain diseases, but in the instance of typhoid fever, other cases than those that originated in the hospitals were unrecorded. Vast numbers of ailing men were sent to the general hospitals from the field, especially when the army was on the eve of a move. Few of these were entered as typhoid fever on the field reports, although had they continued longer under observation this diagnosis would have been authorized; and in many instances, unfortunately, opportunity was afforded after death for its verification. The number of these unreported cases must have been very large, for the experience of medical officers in charge of general hospitals near the base of operations of troops on field service testifies to the frequency with which typhoid fever reached their wards without appearing on the antecedent records. In view of these unregistered cases, which contributed largely to the recorded deaths, it is impossible to ascertain the actual percentage of fatality of the continued fevers.

The ratios of typhoid fever are modified also by the withdrawal of so many of the cases into the typho-malarial group, while those of the typho-malarial fevers are valueless from the uncertainty as to the nature of the fevers thus reported and the certainty that, as may be inferred from the ratios themselves, not all of the cases possessed a typhoid element. The comparatively small percentages of fatality sometimes recorded for typhus are explained by the entry of the cases in accordance with the diagnosis under the typhus heading, and of the resulting deaths, in view of *post-mortem* revelations, under the heading typhoid—the typhoid rate thereby becoming augmented at the expense of the other.

But although of little value as indices of the fatality of the continued fevers, the ratios presented above are admissible evidence of the increased gravity of the cases as the war progressed; for the statistics from which they were calculated were gathered under similar conditions.

The average annual rates per thousand of strength show, in Table XLIII, a similarity

TABLE XLIII.

Comparison of the Frequency of Cases of the Continued Fevers, and of the Deaths occasioned by them, among the White and the Colored Troops, as shown by the average numbers annually recorded, reduced to ratios per thousand of strength; the figures for the White Troops based on the statistics of the period May 1, 1861, to June 30, 1866, and those for the Colored Troops on the statistics of the three years July 1, 1863, to June 30, 1866.

DISEASE.	WHITE TROOPS.		COLORED TROOPS.	
	Cases.	Deaths.	Cases.	Deaths.
Typhoid Fever	33.83	11.18	22.32	11.89
Typhus Fever	1.12	.35	.67	.56
Common Continued Fever	37.07	.44		
Typho-malarial Fever	26.15	1.95	41.06	6.79
Total Continued Fevers	62.67	13.27	64.05	19.24

in the rates of prevalence among the white and the colored troops, 62.67 and 64.05 per thousand respectively; but the mortality was greater among the colored than among the white men, 19.24 as compared with 13.27. This increased mortality was caused by the typho-malarial cases, they having occasioned 6.79 deaths per thousand of strength as against 1.95 among the whites. The mortality from typhoid was similar in both, but the cases having been less numerous among the colored men their larger percentage of fatality, already noted, is explained. The slight prevalence of cases reported as typhus, 1.12 among the white and .67 among the colored soldiers, accounts for an annual mortality which was less among the white troops than that from common continued fever, notwithstanding the high rate of fatality that attended the typhus cases.

PREVALENCE AS RELATED TO SEASON AND LOCALITY.—To reduce the size of Table XLIV, and at the same time to simplify figures, the data on the seasonal and regionic prevalence of the fevers reported typhus have been consolidated with the statistics of the typhoid cases. This might have been done with propriety in all the tables of this section; for, as will be shown hereafter,* the greater number of the cases reported as typhus were in reality cases of typhoid fever; but it was deemed advisable to present in certain of these tables the rates of the reported cases of typhus by way of intimating to some extent the modification of the typhoid cases by crowd-poisoning, as the typho-malarial cases similarly, but perhaps less certainly, indicate their modification by the malarial influence.

TABLE XLIV.

Showing the Variations in the Prevalence of the Continued Fevers among White Troops in the various Regions during the years of the War and the year following the War, expressed in monthly ratios per thousand of mean strength.

YEAR ENDING JUNE 30, 1862.

DISEASE.	REGIONS.	1861.						1862.						FOR THE YEAR.
		JULY.	AUGUST.	SEPTEMBER.	OCTOBER.	NOVEMBER.	DECEMBER.	JANUARY.	FEBRUARY.	MARCH.	APRIL.	MAY.	JUNE.	
Typhoid and cases reported as Typhus	Atlantic	2.3	4.6	5.8	7.1	9.1	8.3	5.8	4.6	3.2	6.0	5.9	7.8	74.0
	Central	1.8	2.8	9.4	12.1	13.2	9.8	10.4	7.1	6.0	6.9	8.7	6.3	99.8
	Pacific	.2	------	------	2.5	1.4	1.0	.3	.5	.8	------	------	.4	8.1
In all the regions		2.0	4.0	6.5	8.6	10.2	8.5	7.0	5.1	3.9	6.3	7.2	7.0	81.6
Common Continued Fever	Atlantic	3.4	4.5	4.2	4.7	5.3	2.3	2.4	2.6	2.4	3.5	3.5	4.3	41.4
	Central	1.0	2.7	4.0	6.1	4.3	3.7	2.2	1.7	1.7	3.6	4.8	4.9	45.2
	Pacific	.4	.9	3.8	1.2	1.0	.8	.6	1.1	1.3	.7	4.1	3.3	16.5
In all the regions		2.1	3.9	4.2	5.0	4.8	2.8	2.3	2.4	2.2	3.5	4.1	4.6	42.1
All the Continued Fevers	Atlantic	5.7	9.1	10.0	11.8	14.4	10.6	8.2	7.2	5.6	9.5	9.4	12.1	115.4
	Central	2.8	5.5	13.4	18.2	17.5	13.5	12.6	8.8	7.7	10.5	13.5	11.2	145.0
	Pacific	.6	.9	3.8	3.7	2.4	1.8	.9	1.6	2.1	.7	4.1	3.7	24.6
In all the regions		4.1	7.9	10.7	13.6	15.0	11.3	9.3	7.5	6.1	9.8	11.3	11.6	123.7

* *Infra*, p. 324.

YEAR ENDING JUNE 30, 1863.

Disease.	Regions.	1862.						1863.						For the Year.
		July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Typhoid and cases reported as Typhus	Atlantic	8.7	8.4	7.8	7.4	7.4	6.8	5.5	4.8	4.8	3.0	2.6	2.4	61.7
	Central	4.7	4.6	3.5	4.4	4.6	4.0	4.8	4.9	4.8	3.5	2.4	1.8	48.1
	Pacific	.2	2.9	6.1	2.7	2.1	.7	.6	.4	.3	------	------	.3	13.0
In all the regions		6.7	7.6	6.1	7.8	5.8	5.4	5.1	4.8	4.7	3.2	2.5	2.0	53.9
Typho-malarial Fever	Atlantic	4.1	4.1	3.6	3.4	3.8	3.8	4.2	2.9	2.7	2.5	2.7	3.5	42.3
	Central	4.8	4.5	3.2	3.2	2.3	1.5	2.8	3.9	3.3	2.6	2.1	2.0	34.8
	Pacific	2.6	2.1	1.6	2.2	.9	3.4	.2	.8	.7	1.3	.7	2.2	18.0
In all the regions		3.4	4.5	3.2	3.3	3.6	2.9	3.4	3.4	3.0	2.6	2.3	2.6	38.0
All the Continued Fevers	Atlantic	14.6	13.4	11.1	10.8	11.2	10.1	9.7	7.7	7.5	5.5	5.3	5.9	104.6
	Central	8.5	8.1	6.7	7.6	6.9	6.5	7.6	8.8	8.1	6.1	4.5	3.8	82.9
	Pacific	2.2	4.6	4.7	4.9	3.0	4.1	.8	1.2	1.0	1.3	.7	2.5	31.0
In all the regions		12.2	8.6	8.3	8.1	8.5	8.3	8.5	8.2	7.7	5.8	4.8	4.6	91.9

YEAR ENDING JUNE 30, 1864.

Disease.	Regions.	1863.						1864.						For the Year.
		July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Typhoid and cases reported as Typhus	Atlantic	2.9	3.0	2.8	2.0	1.5	1.2	1.3	.	1.0	1.0	.9	1.4	19.6
	Central	2.3	2.2	1.9	1.3	1.1	.4	1.4	.7	1.0	1.0	1.0	1.5	15.7
	Pacific	.3	.5	.1	1.0	1.3	.3	.4	.2	.2	------	.5	.3	4.8
In all the regions		2.3	2.5	2.2	1.7	1.4	1.0	1.3	.7	1.0	1.0	1.0	1.5	16.9
Typho-malarial Fever	Atlantic	4.4	4.2	3.9	2.8	1.8	1.4	1.3	.7	.7	.9	1.2	3.1	24.6
	Central	2.3	1.2	1.9	1.4	1.1	.8	.6	.5	.7	.7	1.0	1.5	16.1
	Pacific	.8	.2	.5	.1	.4	.2	.2	.4	.1	.1	.2	.1	3.0
In all the regions		3.4	3.7	3.3	1.9	1.4	1.0	.8	.6	.7	.7	1.0	2.0	18.9
All the Continued Fevers	Atlantic	7.3	7.2	6.8	4.8	3.3	2.4	2.6	1.0	1.7	1.9	2.1	4.5	44.2
	Central	4.6	3.4	3.8	2.7	2.0	1.2	1.8	1.2	1.7	1.7	2.0	3.0	31.8
	Pacific	1.1	.7	.4	1.1	1.7	.7	.6	.6	.3	.1	.7	.4	7.8
In all the regions		5.7	6.0	4.5	3.4	2.7	1.3	2.1	1.3	1.7	1.7	2.0	3.5	35.8

YEAR ENDING JUNE 30, 1865.

Disease.	Regions.	1864.						1865.						For the Year.
		July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Typhoid and cases reported as Typhus	Atlantic	2.9	2.9	1.7	1.9	1.9	1.5	1.6	1.6	1.2	1.0	1.3	1.6	20.4
	Central	2.1	2.0	2.4	1.4	1.2	1.0	1.3	.8	1.0	.7	.7	.8	15.8
	Pacific	.3	.1	.8	.7	.3	.4	.6	.3	.2	.4	.5	.3	4.8
In all the regions		2.4	2.2	2.1	1.6	1.5	1.2	1.4	1.2	1.1	.9	1.0	1.2	17.5
Typho-malarial Fevers	Atlantic	7.6	6.6	4.8	4.0	2.9	1.6	1.4	1.3	1.5	1.4	1.7	1.6	34.4
	Central	2.1	2.3	1.7	1.2	.7	1.1	.8	.4	1.0	1.2	.8	1.4	14.9
	Pacific	------	.1	.7	1.1	.5	.2	.4	------	------	.1	------	------	2.6
In all the regions		4.2	3.8	2.9	2.4	1.6	1.3	1.1	.8	1.2	1.2	1.2	1.4	22.9
All the Continued Fevers	Atlantic	10.5	9.5	6.5	5.9	4.8	3.1	3.0	2.9	2.7	2.4	3.0	3.2	54.8
	Central	4.2	4.3	4.1	2.6	1.9	2.1	2.1	1.2	2.0	1.9	1.5	2.2	30.7
	Pacific	.3	.2	1.2	1.8	.8	.6	1.0	.3	.2	.5	.5	.3	7.4
In all the regions		6.6	6.6	5.0	4.0	3.1	2.5	2.5	2.0	2.3	2.1	2.2	2.6	40.4

YEAR ENDING JUNE 30, 1866.

Disease.	Regions.	1865.						1866.						For the Year.
		July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Typhoid and cases reported as Typhus	Atlantic	1.7	1.9	1.7	2.6	1.5	.8	.5	.6	.7	.4	.4	.4	17.9
	Central	1.2	1.2	1.2	1.2	.6	.3	.3	.4	.4	.3	.5	.3	11.2
	Pacific	.4	.7	.5	.8	.3	.2	.3	1.0	.7	1.3	1.0	.5	7.5
In all the regions		1.4	1.4	1.3	1.7	1.0	.5	.4	.6	.6	.6	.6	.4	13.3
Typho-malarial Fever	Atlantic	1.4	1.7	1.6	1.7	.5	.2	------	.5	------	------	.1	.2	18.0
	Central	4.5	1.7	1.0	1.1	.9	.5	.1	------	------	------	.1	1.2	22.5
	Pacific	.6	.1	------	------	.2	.1	------	------	------	.1	.1	.5	1.5
In all the regions		3.1	1.6	1.1	1.2	.6	.2	.1	.1	------	------	.1	.7	16.6
All the Continued Fevers	Atlantic	3.1	3.6	3.3	4.3	2.0	1.0	.5	.9	.7	.4	.5	.6	30.9
	Central	5.7	2.9	2.2	2.3	1.5	.8	.4	.4	.4	.3	.6	1.5	33.7
	Pacific	1.0	.8	.5	.8	.5	.3	.3	1.0	.7	1.4	1.1	1.0	9.0
In all the regions		4.5	3.0	2.4	2.9	1.0	.7	.5	.7	.9	.6	.7	1.1	29.0

The striking irregularities in the monthly rates of prevalence of the continued fevers as a class may be more readily observed by means of the plate facing page 199 than by the tabulated figures. There are six notable prominences on their line of prevalence: one, the highest, culminating in November, 1861; the second, less acute, spreading over the months of May, June and July, 1862; the third, still more obtuse, covering the last

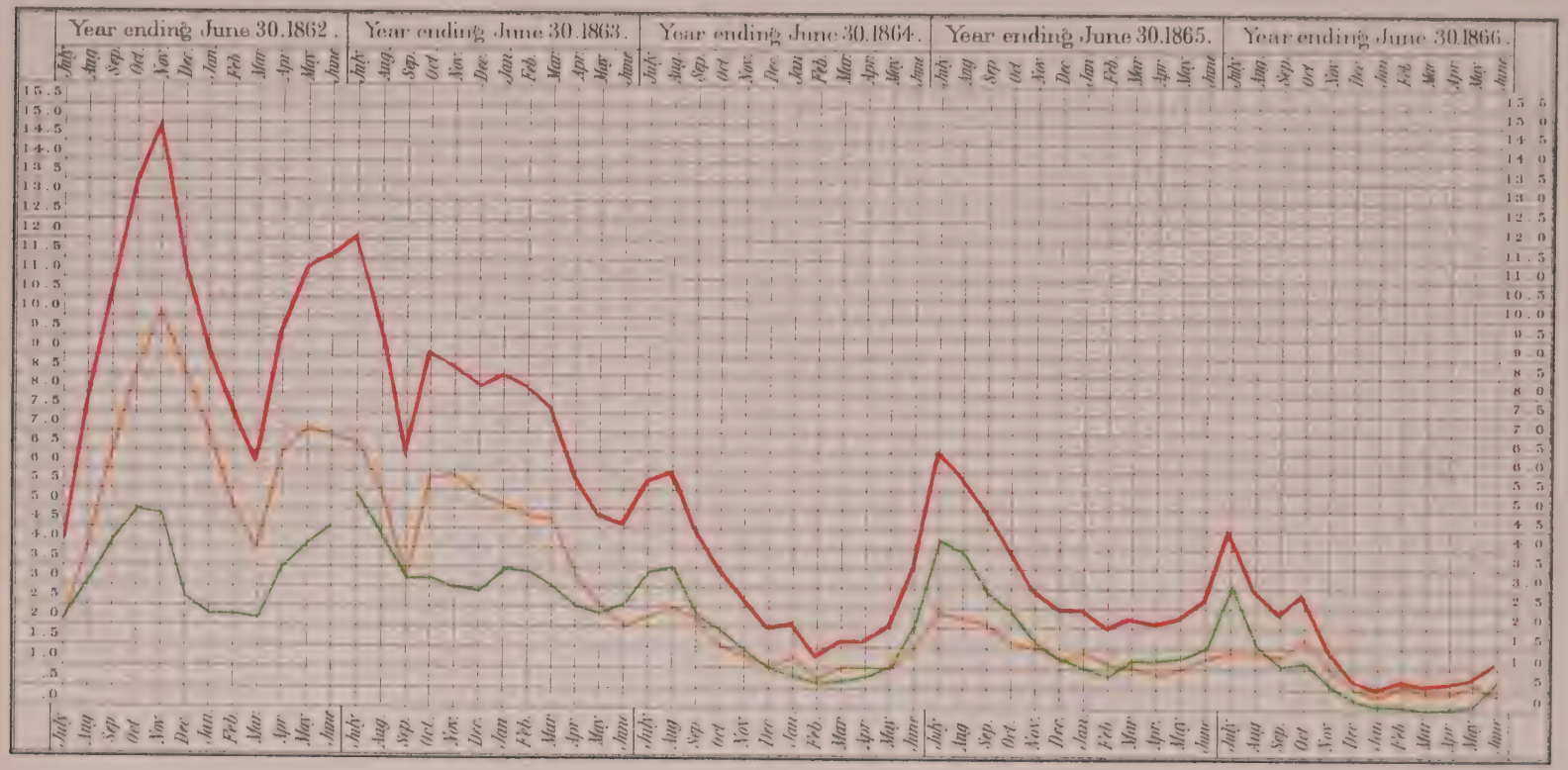
Lines indicating the Prevalence of the Continued Fevers among the White Troops.

Monthly rates of the Fevers as a class.

" " " Typhus and Typhoid Fevers.

" " " Common Continued Fever up to June 30. 1862, and of Typho-malarial Fever after that date.

} *per 1000 of strength.*


Year ending June 30.1862.
Year ending June 30.1863.
Year ending June 30.1864.
Year ending June 30.1865.
Year ending June 30.1866.
July Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. June
15.5 15.0 14.5 14.0 13.5 13.0 12.5 12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 .5 .0

three months of 1862 and January and February of 1863; the other three prominences are acute and culminate in August, 1863, and in July of 1864 and 1865.

Evidently something more than mere seasonal change was involved in the production of the first of these waves of prevalence, for while in September, 1861, the line tends to the summit of the first elevation, in September, 1862, it forms the angle of the deep sulcus between the second and third, and whilst it falls in the winter months of 1861, the corresponding months of 1862 sustain it on the crest of the third epidemic wave. On the other hand, the prominences occurring in July and August of 1863, 1864 and 1865 suggest by their regularity a seasonal influence, which is seen by the green line to have been due to the prevalence of typho-malarial fever.

The elevations of the line indicating typhoid fever show that the poison of this disease was the principal cause of the irregular waves of febrile prevalence during the early period of the war. The sudden aggregation of young men in camps where they were exposed to influences favorable to the spread of this disease accounts for its rapid increase from May to November, 1861. During this period the troops which furnished the statistics were increased from sixteen thousand to three hundred thousand men, under President LINCOLN's call of April 15 for 75,000 men for three months and the closely following act of Congress, approved July 22, calling for 500,000 men for three years. This suggests the explanation of the irregularities in the second and third prominences of the line of prevalence of the continued fevers. In November, 1861, the epidemic among those who responded to these calls was at its height, 15.03 monthly per thousand of strength, after which it subsided rapidly to 6.14 in March, 1862. But meanwhile the army became augmented in response to a requisition for 300,000 three-years' men; and this second aggregation was followed by a second epidemic which, as the volunteers responded less promptly than on the first call, had a less prominent but more prolonged acme, yielding in May 11.30, in June 11.55 and in July 12.11 cases in every thousand men, after which the disease again subsided to 6.33 in September. About this time the call for 300,000 nine-months' men occasioned the third epidemic wave by the fresh material thus brought into the camps; but as the men arrived more slowly than on the former requisitions the monthly rate during the acme in October, 9.07, was not so high as during the previous visitations. Nevertheless the susceptible men of the new levies did not escape, but were seized with fever as they arrived, giving monthly rates of 8.80, 8.29, 8.52 and 8.22 for the four months next following. In March the epidemic began to subside, and as no large bodies of new troops were added to the army after this date until the expiration of the term of service of the three-years' men, the only prominences in the line of prevalence are those already noted as occurring towards the end of summer, and evidently occasioned in great part by the malarial element of the fevers reported as typho-malarial. It is probable, however, that into the first of these, that culminating in August, 1863, there entered febrile cases from the regiments that responded to the call issued June 15, for men for temporary service in protecting Maryland and Pennsylvania from invasion; and it is equally probable that the high rates of July and August, 1864, were in part the effect of the replacement of discharged veterans by fresh levies.

It appears, therefore, that outside of the influence exercised on the rates of prevalence of the continued fevers by the absorption of certain malarial cases the statistics afford no information concerning variations due to seasonal changes. If any such were present they

were of so slight a character as to be swamped in those arising from the one great cause of variation—the number of men present susceptible to the action of the febrile poison.*

From this view of the line of prevalence of the continued fevers, and from what has been said of the increasing gravity of the cases as the war progressed, it will be readily understood that the line of mortality, while presenting prominences similar to those on the line of prevalence, would not, if drawn, be separated from that line throughout its course by the same multiple of its own height, but by a lesser multiple at points near the end than at points near the beginning. The monthly variations in the mortality rates from typhoid fever have already been illustrated on the tinted diagram facing page 20.

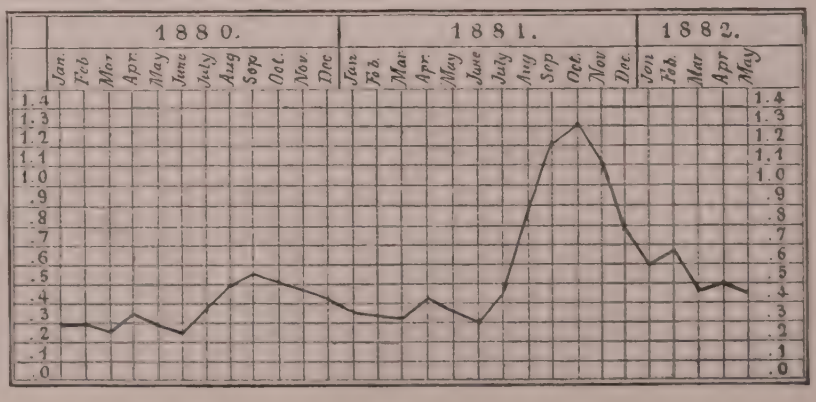
The lines of prevalence and mortality among the colored troops are traced on the plate facing this page. Typhoid cases formed a larger proportion of the strength present at the beginning of the term of service than at subsequent dates; but the line of prevalence is irregularly elevated as fresh regiments were mustered into service. The line expressing the prevalence of the continued fevers as a class presents three very notable seasonal prominences, due principally to the presence of fevers reported as typho-malarial.

In treating of the paroxysmal fevers the seasonal variation was emphasized by consolidating the rates for the corresponding months of the several years into a line expressing the average rate for each of the months or the average annual curve; but in the case of the fevers now under consideration the prominences due to the aggregation of susceptible material are the main factors in determining the contour and level of the line obtained by such a consolidation. The average line for the white troops, as shown on the diagram on the opposite page, exhibits a notable elevation in July, 7.14 per thousand strength, due to the malarial element of the fevers, and a smaller elevation stretching over the months of October and November, due, so far as shown by the data, to the incomplete levelling of the epidemic prominences.

The average annual curve of prevalence among the colored troops presents a marked elevation in July, August and September, 9.31, 9.45 and 8.64, respectively, per thousand men present. This is evidently due mainly, but not wholly, to malarial influences; for while typho-malarial fever certainly contributed to the elevation, typhoid fever was also more prevalent then than at other seasons. In view of the greater prevalence of typhoid in the first July of their service, as delineated in the plate facing this page, the composition of the prominence under consideration may be appreciated.

* There are many observations in the literature of typhoid showing its increased prevalence in the late autumn and winter months, its diminished prevalence in the spring and its presence at all seasons: but in this country there have been few statistics gathered on the large scale. The National Board of Health collected and published weekly mortality returns during the period from January, 1880, to May, 1882. Cities and towns aggregating a population of about eight millions were represented in these returns. The absolute figures as reported in the instance of typhoid fever have been converted into monthly rates expressed as annual rates per thousand of population, and from them the accompanying diagram has been drawn.

DIAGRAM *showing by annual rates per thousand the seasonal variations in the mortality, and hence in the prevalence of typhoid fever, among a United States population of about eight millions.*



Lines indicating the Prevalence and Mortality of the Continued Fevers among the Colored Troops.

Monthly rates of the Fevers as a class.
" " " Typho malarial Fever.
" " " Typhoid Fever.
" Death Rates from all the Fevers.
} *per 1000 of average strength.*

In Dec. 1864 the death line runs into that of typhoid prevalence, the two in the remainder of their course being almost coincident.

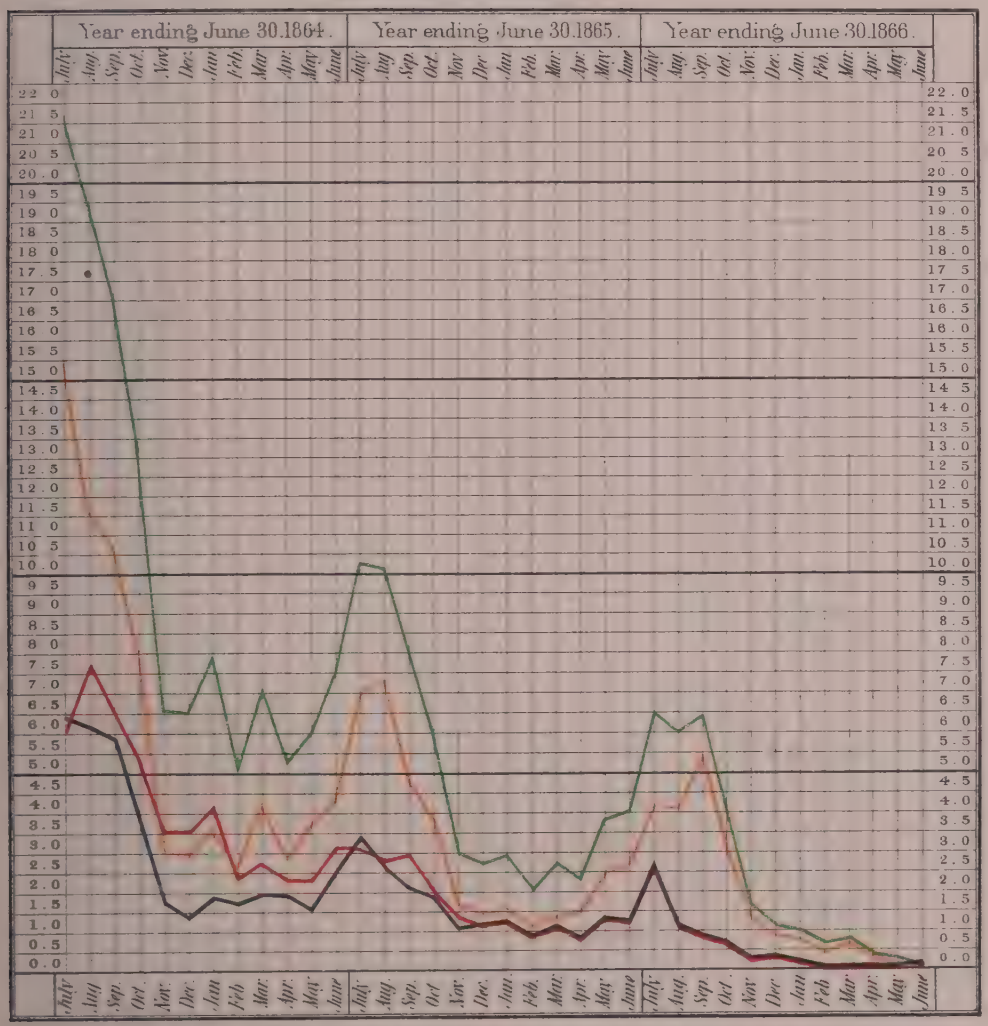
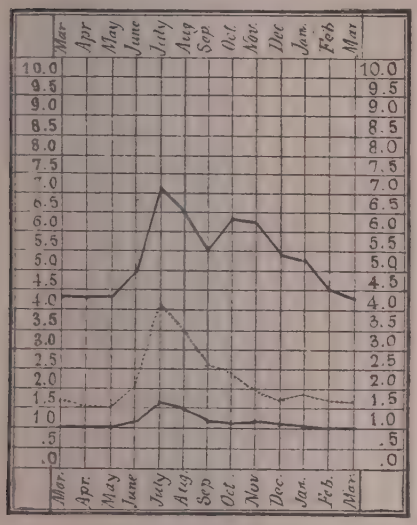


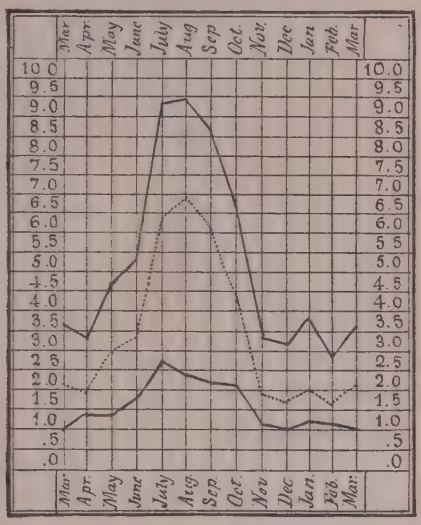
DIAGRAM *showing the average annual curves of prevalence and mortality of continued fevers.*

The upper unbroken line shows the rate of prevalence of the fevers as a class, the lower the death-rates caused by them. The dotted line represents the prevalence of typho-malarial fever, and the space between it and the line above it the prevalence of typhoid fever.

WHITE TROOPS.



COLORED TROOPS.



The data from which these curves have been constructed are submitted in the two tables which follow:

TABLE XLV.

Seasonal Variations in the Prevalence and Mortality of the Continued Fevers among the White Troops, expressed in average monthly rates per thousand of strength, obtained by the consolidation of the figures for the corresponding months of each of the years covered by the statistics.

DISEASES.	JULY.	AUGUST.	SEPTEMBER.	OCTOBER.	NOVEMBER.	DECEMBER.	JANUARY.	FEBRUARY.	MARCH.	APRIL.	MAY.	JUNE.
Cases of—												
Typhoid Fever (*a*)	2.98	2.80	2.61	3.50	3.78	3.43	3.22	2.64	2.46	2.35	2.33	2.40
Typhus Fever (*a*)	.15	.12	.08	.09	.09	.07	.08	.08	.10	.09	.08	.10
Common Continued Fever (*b*)	2.16	3.92	4.14	5.02	4.82	2.76	2.33	2.33	2.20	3.49	4.14	4.56
Typho-malarial Fever (*c*)	4.07	3.52	2.64	2.45	1.98	1.71	1.85	1.66	1.65	1.50	1.51	2.04
All the Continued Fevers (*d*)	7.14	6.47	5.47	6.35	6.24	5.37	5.23	4.48	4.28	4.25	4.35	4.99
Deaths from—												
Typhoid Fever (*a*)	1.34	1.20	.89	.91	1.00	.96	.89	.85	.84	.84	.86	.93
Typhus Fever (*a*)	.04	.03	.02	.02	.03	.03	.02	.04	.05	.03	.03	.03
Common Continued Fever (*b*)	———	.02	.04	.03	.03	.02	.03	.02	.01	.09	.06	.10
Typho-malarial Fever (*c*)	.27	.30	.27	.18	.14	.10	.13	.12	.13	.10	.10	.16
All the Continued Fevers (*d*)	1.64	1.51	1.16	1.09	1.16	1.08	1.03	.99	1.00	.97	.98	1.10

(*a*) The rates for typhoid and typhus are the average rates of the five years July 1, 1861, to June 30, 1866.

(*b*) The common continued fever rates are those for the year ending June 30, 1862.

(*c*) The typho-malarial rates are the averages of the four years July 1, 1862, to June 30, 1866.

(*d*) The rates for these fevers as a class are the averages of the facts recorded during the five years aforesaid; they are of necessity not the sum of the rates of the specified fevers, as neither common continued fever nor typho-malarial fever was reported during the whole of the five years.

Table XLVI.

Seasonal Variations in the Prevalence and Mortality of the Continued Fevers among the Colored Troops, expressed as average monthly rates per thousand of strength, obtained by the consolidation of the figures for the corresponding months of each of the three years, July 1, 1863, to June 30, 1866.

Diseases.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.
Cases of—												
Typhoid Fever	2.94	2.55	2.40	2.14	1.46	1.47	1.82	1.18	1.47	1.64	1.61	1.97
Typhus Fever	.09	.08	.14	.07	.02	.04	.04	.05	.06	.02	.09	.08
Typho-malarial Fever	6.04	6.87	6.10	4.44	1.89	1.67	1.67	1.56	2.15	1.95	2.95	3.29
All the Continued Fevers	9.31	9.45	8.64	6.65	3.37	3.18	3.53	2.79	3.64	3.61	4.65	5.34
Deaths from—												
Typhoid Fever	1.38	1.23	1.22	1.14	.69	.68	.89	.84	.68	.88	.89	1.12
Typhus Fever	.08	.07	.07	.04	.01	.02	.02	.02	.06	.07	.08	.06
Typho-malarial Fever	1.02	1.11	.87	.07	.48	.30	.27	.28	.11	.49	.48	.49
All the Continued Fevers	2.68	2.41	2.16	2.12	1.08	1.00	1.18	1.14	.97	1.49	1.42	1.79

The regionic figures in Table XLIV show that the lines of prevalence in the Atlantic and Central regions conform in their general course to that already submitted from the army as a whole. Each presents three irregular prominences in the earlier part of its course not referable to seasonal or regionic influence, but to the aggregation of men under the calls for troops; and each shows subsequently three other prominences, apparently seasonal in their recurrence, and corresponding with an increase in the typho-malarial rates. The line of prevalence in the Pacific region is less regular, but even in it the general contour of the line of the army may be observed. These have been traced on the diagram which faces this page.

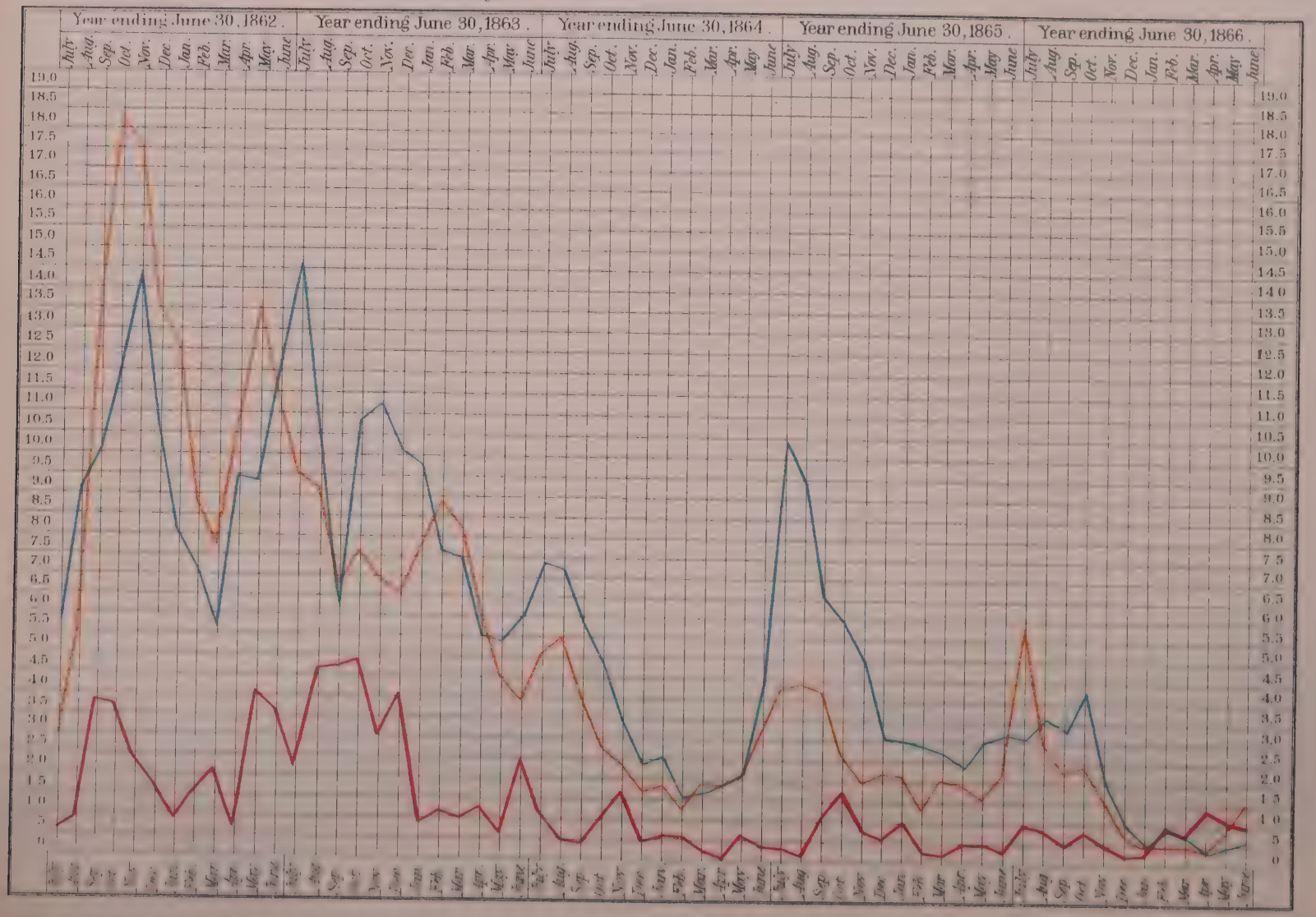
The highest rate of prevalence in the Atlantic region was 14.6, in July of the second epidemic wave; the highest in the Central region, 18.2, was in October of the first epidemic wave; the highest, 4.9, in the line of the Pacific region, was reached in October of the third wave. Although the Central region contributed the highest monthly rate and the highest annual rates during the first and last years, the high annual rates furnished by the fevers of the Atlantic region during the three intervening years gave that region the highest average rate.

The inconsiderable number of troops in the Pacific region, 10,172, when the maximum rate was yielded, is naturally suggested as a possible cause of the small size of this maximum and of the generally low level of the line of prevalence in that region. But the Central region furnished its maximum of 18.2 when only 81,387 men were present, while the maximum of the Atlantic region was only 14.6, although the strength for the month amounted to 227,419 men. Again, the annual rate for the first year was greater in the Central region, 145 per thousand of strength, than in the Atlantic region, 115.4, although in the latter the average strength was 176,650, as compared with 105,108 in the former. The mere aggregation of troops in a region has therefore apparently but little influence on the prevalence of these fevers. Nor does the narrowing of the limits from the region to

Lines indicating the Prevalence of the Continued Fevers in the three Regions.

Atlantic Region
Central Region
Pacific Region

Monthly rates per 1000 of strength.



the department develope in the statistics of the latter any special influence of locality or of aggregation on the occurrence of the continued fevers. It is evident that for an explanation of all the facts we must go behind these aggregations to the susceptibility of the material of which they were composed.

TABLE XLVII.

Showing the relative Frequency of the reported forms of the Continued Fevers among the White Troops in the several Departments and Regions during the four years of war service from July 1, 1861, to June 30, 1865.

DEPARTMENTS AND REGIONS.	Years of active service embraced in the statistics.	Total number of cases of the Continued Fevers.	Average annual ratio of cases per thousand of strength.	Reported forms of Fever as percentages of the total number of cases.					
				During the year ending June 30, 1862, when Common Continued Fever was reported.			During the three years from June 30, 1862, to June 30, 1865, when Typho-malarial Fever was reported.		
				Typhoid.	Typhus.	Common continued.	Typhoid.	Typhus.	Typho-malarial.
Department of the East	2d, 3d & 4th	909	27	----------	----------	----------	78.0	3.6	18.4
Middle Department	1st, 2d, 3d & 4th	3,285	71	62.1	6.4	31.5	73.9	5.9	20.2
Department of the Shenandoah	1st	1,114	69	66.0	1.6	32.4	----------	----------	----------
Middle Military Division	4th	1,654	35	----------	----------	----------	49.5	2.1	48.4
Department of Washington	2d, 3d & 4th	10,818	105	----------	----------	----------	56.7	1.0	42.3
Army of the Potomac	1st, 2d, 3d & 4th	37,053	84	64.0	1.4	34.6	48.4	1.0	50.6
Department of the Rappahannock	1st	1,385	98	60.9	7.2	31.9	----------	----------	----------
Department of Virginia	1st, 2d, 3d & 4th	7,182	69	54.6	4.9	40.5	40.9	.6	58.5
Department of North Carolina	1st, 2d, 3d & 4th	4,713	102	65.8	1.5	32.7	43.2	1.7	55.1
Department of the South	1st, 2d, 3d & 4th	4,664	72	45.6	.5	53.9	31.0	.6	68.4
Atlantic Region		72,777	79	62.1	2.0	35.9	49.7	1.3	49.0
Department of the Northwest	1st, 2d, 3d & 4th	799	40	57.1	35.7	7.2	84.0	2.0	14.0
Northern Department	2d, 3d & 4th	1,581	41	----------	----------	----------	64.3	2.4	33.3
Department of West Virginia	1st, 2d & 3d	6,091	99	70.1	2.3	27.6	68.5	1.4	30.1
Department of Missouri	1st, 2d, 3d & 4th	5,310	53	62.9	3.8	33.3	61.1	3.2	35.7
Department of the Ohio	2d & 3d	2,968	56	----------	----------	----------	64.3	1.4	34.3
Department of the Cumberland	1st, 2d & 3d	13,327	62	68.9	2.7	28.4	61.0	1.3	37.7
Department of the Tennessee	1st, 2d & 3d	15,467	63	67.8	2.0	30.2	50.8	1.8	47.4
Military Division Mississippi, Part I	4th	3,928	36	----------	----------	----------	48.3	.5	51.2
Military Division Mississippi, Part II	4th	1,599	18	----------	----------	----------	38.8	.7	60.5
Department of Arkansas	2d & 3d	1,801	33	----------	----------	----------	39.7	2.8	57.5
Department of the Gulf	1st, 2d, 3d & 4th	10,145	82	31.2	7.3	61.5	38.4	2.9	58.7
Central Region		63,016	56	66.0	2.8	31.2	52.6	1.9	45.5
Department of New Mexico	1st, 2d, 3d & 4th	284	19	15.7	----------	84.3	40.6	1.9	57.5
Department of the Pacific	1st, 2d, 3d & 4th	352	15	42.4	1.9	55.7	52.0	4.1	43.9
Pacific Region		636	16	31.8	1.1	67.1	46.7	3.1	50.2
Total in all the Regions		136,429	65	63.6	2.4	34.0	51.1	1.6	47.3

On account of the greater prevalence of the continued fevers during the early period of the war, comparisons in this connection can be instituted with propriety only on the statistics of those departments that were kept intact during the four years of active war

service. It would be inadmissible, for instance, to contrast the annual rate of 18 per thousand among the veteran soldiers of the Military Division of the Mississippi, who marched from Atlanta to the coast, with the 72 per thousand furnished by the troops who operated on the seaboard of the department through which the march was made, because the latter rate includes the larger figures of the early period, while the former is unaffected by them.

Looking only at those departments from which reports were furnished during the whole period of active operations, the rates of 69 in the Department of Virginia, 84 in the Army of the Potomac and 102 in the Department of North Carolina, all of which commands were contiguous geographically, indicate that departmental locality exercised no marked influence on the number of cases.

Again, as to aggregation in the departments. The comparatively low rate in the Department of the Northwest, and the small number of troops operating within its limits, support the idea suggested by similar conditions in the Departments of the Pacific region, especially in view of the larger rates already instanced, in departments which contained a larger number of men. But when the statistics of these are compared with each other it is found that the fever rates did not increase in proportion to the strength present. In the Army of the Potomac, with an average strength of 109,734 men, the average annual rate of prevalence was 84 per thousand, while the adjoining territorial command, the Department of North Carolina, gave a rate of 102 in a strength of only 15,541 men.

The consolidated statistics now under consideration are incompetent to show precisely whether concentration in a locality exercised an influence on the prevalence of the fevers. As the rate was greater in the Department of North Carolina than in the Army of the Potomac it would seem that local conditions were more efficient than mere concentration in promoting their spread; for the small number of troops in the department mentioned rendered impossible such a concentration of forces as was found in the camp of the Army of the Potomac. But the influence of susceptible material in the ranks was so great that conclusions drawn from figures merely are necessarily of doubtful value. This influence has been seen in the elevation of the line of prevalence following the arrival of fresh troops. It may also be observed in the table now submitted, by comparing the rates in the Department of the Shenandoah, 69, and in the Department of the Rappahannock, 98, gathered during the first year of the war, with the rates in the Middle Military Division, 35, and in the Military Divisions of the Mississippi, 18 and 36, collected during the fourth year of service. The highest rate, 105, in the Department of Washington, appears exceptional, as it has not include the records of the first year. But this department was in a measure a camp of organization and equipment for new and undisciplined regiments, which were subsequently transferred, as the occasion required, to other points for active service. Young soldiers passed through it on their way to the front; hence the high rates yielded by its reports. The rate in this department during the fourth year, 73.6, was higher than that of the Shenandoah in the first year of the war. In the third year, when there were fewer changes in the personnel, the rate fell to 63.8. The rate for the second year was 151.0. During the first year the reports from the troops in Washington and its vicinity were consolidated with the returns from the Army of the Potomac, which furnished a rate of 126.2 per thousand of strength.

In the other columns of this table may be observed the relative frequency of the

reported forms of fever expressed in percentages of the whole number of febrile cases. During the period when the term common continued fever was in use typhoid fever constituted nearly two-thirds of the cases except in the Pacific region and the Department of the Gulf, where, on the contrary, common continued fever formed this proportion of the whole. During the period when the term typho-malarial was in use, about one-half of the febrile cases were reported as typhoid. A small percentage, larger generally in the earlier than in the later years, appeared as typhus. The unusual percentages of typhus and common continued fevers returned from the Department of the Northwest during the first year of the war originated in the inconsiderable number of cases entering into the calculation, only fourteen, of which five were said to have been typhus and one common continued fever.

It is worthy of note, as bearing on the disposition made of the continued febrile cases after the term common continued fever was removed from the reports, that those departments from which a large percentage of that form of fever was reported were subsequently characterized by a large percentage of typho-malarial cases. Thus, while common continued fever formed 34.0 per cent. and typho malarial 47.3 per cent. of the reported forms in the Army as a whole, the Departments of the South, the Gulf, Virginia and New Mexico gave, in both instances, percentages largely in excess of the average. Nevertheless, a high percentage of common continued fever in the Department of the Pacific was not followed by a correspondingly high typho-malarial figure; and, on the other hand, as equally exceptional, a high percentage of typho-malarial fever in the Army of the Potomac and in the Department of North Carolina was not preceded by corresponding figures under the heading common continued fever.

Lastly, variations in the percentages of typho-malarial fever may be noted as having been wholly unconnected with the prevalence of the continued fevers as a class. This may be illustrated by taking as a standard the figures furnished by the Army of the Potomac. In that army 84 febrile cases occurred annually in every thousand men, and of these 50.6 per cent. were typho-malarial cases. But in the Departments of West Virginia and North Carolina a greater number of cases than 84 occurred annually, while the percentage of typho-malarial cases in the one department was greater, and in the other smaller, than in the Army of the Potomac; and on the other hand, in the Departments of Missouri and the South a number of cases considerably less than the standard, 84, occurred annually, while the percentage of the typho-malarial cases, as in the other two departments instanced, was in one greater and in the other smaller than in the Army of the Potomac.

The statistical relations of typho-malarial fever to the purely malarial fevers have already been shown in Tables XXXII and XXXIII.

II.—IN THE CONFEDERATE ARMY.

Evidence has already been cited in Table XIV establishing the fact that in the early period of the war the Southern troops operating in Virginia suffered more from the continued fevers than the soldiers of the Army of the Potomac opposed to them, the annual rates of cases per thousand of strength having been respectively 275 and 125. From the following table, which contrasts the prevalence of these fevers in the two armies during a period of nine months, it is found that the monthly average of cases in each was about the same; but as the United States Army had more than twice the strength of the other the ratio of cases to strength was correspondingly smaller, 10.4 monthly per thousand as against 22.9 in

the Confederate ranks. It may be observed also that this greater ratio in the rebel army was due chiefly to an epidemic that prevailed during the months of August, September, October and November, following the increase of the strength present from 21,577 to 58,918 men, and that at the close of the record in March, 1862, the rate of prevalence was small and almost identical in the two armies. Both commands during this period were composed of raw levies unaccustomed to camp life. Both were similarly rationed, quartered and disciplined, for the officers who organized them had been comrades in their military education and experiences. It would seem, therefore, that local conditions were not responsible for the greater prevalence of fever in the Confederate camps.

The U. S. Army of the Potomac was largely recruited from the urban population of the New England and other Eastern States. In its ranks there was certainly a larger proportion of city men than in the Southern Army. This appears to have a bearing on the greater frequency of typhoid fever in the latter, in view of the well-known facts that a majority of the enteric cases in cities occur in young people recently from country districts, and that an army encampment is in many of its sanitary relations an extemporized city.

Increased rates prevailed also in the Union Army as its strength was augmented by the arrival of fresh troops, but the monthly rate did not rise above 15.9, while in the Confederate camp the rate in September was 45.2 per thousand of strength.

TABLE XLVIII.

Number of Cases of the Continued Fevers in the Confederate and Federal Armies of the Potomac from July 1, 1861, to March 31, 1862, with the ratio per thousand of mean strength for each month.

Months.	Confederate Troops.						United States Troops.					
	Mean strength represented by the reports.	Number of cases of—			Total number of cases.	Ratio of cases per thousand strength.	Mean strength represented by the reports.	Number of cases of—			Total number of cases.	Ratio of cases per thousand strength.
		Typhoid.	Typhus.	Common Continued.				Typhoid.	Typhus.	Common Continued.		
July, 1861	21,577	190	2	31	223	10.4	17,709	39	6	101	146	8.2
August, 1861	50,525	1,716	4	390	2,110	41.8	50,608	311	1	317	629	12.4
September, 1861	58,360	1,801	299	546	2,646	45.2	85,408	504	50	437	991	11.6
October, 1861	58,918	947	221	437	1,605	27.2	113,204	818	34	520	1,372	11.2
November, 1861	55,099	853	132	370	1,355	24.6	133,669	1,456	13	663	2,132	15.9
December, 1861	56,700	566	77	307	950	16.8	152,759	1,351	32	341	1,724	11.3
January, 1862	57,089	398	38	215	651	11.4	167,267	1,098	17	384	1,499	9.0
February, 1862	54,810	283	39	160	482	8.8	153,308	772	12	423	1,207	7.9
March, 1862	31,470	86	1	88	175	5.6	126,588	360	8	310	678	5.4
Monthly average	49,384	760	90	283	1,133	22.9	111,169	745	19	388	1,153	10.4

The only other figures that reveal the numerical status of the continued fevers in the Confederate forces are certain monthly rates calculated and published by Dr. JONES.* These are submitted in juxtaposition with the rates of the white troops of the U. S. Army for the same monthly periods, typho-malarial statistics being included after June, 1862.

* Page 666, Vol. I of his published Memoirs.

TABLE XLIX.

A Comparison of the Prevalence of the Continued Fevers in the Union and Confederate forces during the nineteen months, January, 1862, to July, 1863, inclusive, expressed in monthly ratios per thousand of strength. Typho-malarial cases are included in the statistics of the Union Armies after June 30, 1862.

MONTHS.	CASES OF THE CONTINUED FEVERS EXPRESSED IN MONTHLY RATES PER 1,000 OF STRENGTH.		MONTHS.	CASES OF THE CONTINUED FEVERS EXPRESSED IN MONTHLY RATES PER 1,000 OF STRENGTH.	
	Confederate.	Federal.		Confederate.	Federal.
January, 1862	13.8	9.26	November, 1862	6.4	8.80
February, 1862	11.7	7.46	December, 1862	10.7	8.29
March, 1862	11.6	6.14	January, 1863	8.9	8.52
April, 1862	14.4	9.77	February, 1863	6.1	8.22
May, 1862	13.7	11.30	March, 1863	8.1	7.71
June, 1862	30.2	11.55	April, 1863	11.0	5.80
July, 1862	27.8	12.11	May, 1863	9.0	4.80
August, 1862	18.3	9.63	June, 1863	6.4	4.61
September, 1862	8.5	6.33	July, 1863	9.9	5.27
October, 1862	8.2	9.07	Average monthly rates	7.9	11.2

These figures, so far as they go, strengthen the conclusion derived from the statistics of the Confederate Army of the Potomac, that the Southern troops suffered more from the continued fevers than the Union Army during the epidemics consequent on the aggregation of susceptible material. Their high rates during the months of June, July and August, 1862, followed the Conscription Act of the Confederate Congress, passed April 16, calling out all white men between the ages of eighteen and thirty-five. Their lower rates during the later months cited above, and the lessened prevalence of typhoid in our own camps towards the close of the rebellion, sustain Dr. JONES in his assertion that "typhoid fever progressively diminished during the progress of the war, and disappeared almost entirely from the veteran armies."*

The Confederate death-rate from these fevers cannot be obtained for comparison, but it must of necessity have been considerably higher than the Union rate. While in each camp nearly the same number of cases (see Table XLVIII) were reported as typhoid, the number of cases of common continued fever was smaller and of typhus larger in the Confederate than in the Union Army. Thus, in the former a hundred cases of fever consisted of 67 of typhoid, 25 of common continued and 8 of typhus; in the latter the percentages were 64.6 of typhoid, 33.7 of common continued and only 1.7 of typhus cases. Moreover, it has been shown in Table XIII† that up to December 31, 1862, the number of fatal cases among the Confederate forces was 33.27 per cent. of the whole, as against 22.28 per cent. among the Union troops during the same period. This, in connection with the greater rates of prevalence in the Southern camps, indicates with certainty that the mortality rates, if known, would be considerably higher than those calculated from the Federal statistics. In fact, if the rates of fatality just cited be applied to the rates of prevalence in the Armies of the Potomac, the average mortality rate in the rebel army will be found to have been 7.62 monthly per thousand of strength, as compared with 2.32 among our Northern troops.

The number of cases that terminated fatally in the Chimborazo hospital, Richmond,

* *Op. cit.*, p. 665. † *Supra*, p. 31.

Va., was 885 or 41.11 per cent.* of the total of 2,153 febrile cases with known results, typhoid fever claiming 661 deaths or 47.6 per cent. of 1,388 cases, and common continued fever 224 deaths or 29.3 per cent. of 765 cases.

III.—AMONG THE UNION SOLDIERS, PRISONERS OF WAR.

It has already been shown that at Andersonville, Ga., the rate of prevalence of the continued fevers, 77.4 annually per thousand men present, was higher than the average annual rate among our white or colored troops, and that the mortality rate, 20.5, was nearly double that among our white troops. Nevertheless the rates among the prisoners were very much lower than those calculated for our army during the early periods of epidemic visitation.

The 753 cases and 199 deaths in Table XVI† consisted of 126 cases reported *febris continua communis*, with 10 deaths, equalling 7.9 per cent. of fatality; 155 reported *febris continua simplex*, with 4 deaths, equalling 2.6 per cent., and 472 reported *febris typhoides*, with 185 deaths, equalling 39.2 per cent,—the whole equalling 26.4 per cent.

The cases in Table XV,‡ 281, of which 241 were fatal, were distributed thus:

	Returned to Prison.	Transferred.	Died.	Total Cases.
Fever, Continued,	6	--	3	9
" " Common,	1	--	18	19
" Typhoid,	32	1	220	253
Total,	39	1	241	281

No case of typhus fever was reported.

* See Table XII, p. 30, *supra*.—Dr. JONES, page 664 of his *Medical and Surgical Memoirs*, Vol. I—has published some figures concerning typhoid and common continued fevers which are reproduced in the following tabulation:

Statistics of the Continued Fevers in certain of the Confederate General Hospitals.

Name of Hospital.	Period covered by the Statistics.	Typhoid and Common Continued Fever.		Per cent. of deaths in cases of Typhoid and Common Cont'd Fever.	Total deaths from disease and wounds.	Ratio of deaths from these Fevers per 1,000 deaths from all causes.
		Cases.	Deaths.			
General Hospitals in Virginia out of Richmond	January, 1862, to February, 1863	6,245	1,619	25.90	5,516	293.5
General Hospitals in Richmond, Va	September, 1862, to April, 1863			26.31		249.4
General Hospitals in Virginia	April, 1863, to August, 1863	2,863	509	17.78	2,705	188.2
General Hospital of Charlotteville, Va	July, 1861, to September, 1863	1,312	313	23.86	868	360.6
General Hospital, No. 1, Savannah, Ga	December, 1861, to January, 1864	204	93	45.59	333	279.3
General Hospital, No. 2, Savannah, Ga	June, 1862, to January, 1864	239	42	17.57	125	336.0
Guyton Hospital, near Savannah, Ga	May, 1862, to January, 1864	105	11	10.48	46	239.1
Total		10,968	2,587	23.59	9,593	269.7

These rates of fatality have absolutely no value. They vary from 10.48 per cent. in one hospital to 45.59 per cent. in another; the experience of seven hospitals averaging 23.59 per cent. of fatal cases. It is to be remembered, however, that the cases enumerated were not *bona fide* cases, but in many instances duplications of cases already recorded. On the transfer of a man from hospital to hospital his name was entered as a new case on the register of the hospital to which he was transferred. The influence of this duplication may be in part appreciated when it is known that for every case recorded as sent from the field to the general hospitals there were more than four admissions on the hospital registers. Dr. JONES in the *Richmond and Louisville Medical Journal*, Vol. VIII, p. 347, acknowledges that: "The large number received into hospitals, as shown by these returns, can only be accounted for in the repeated transfers of patients during convalescence, from one hospital to another." To calculate rates of fatality when the deaths are unmodified facts and the cases a multiplication of facts by an unknown number, is manifestly absurd. These registers should have been carefully revised, excluding all admissions, which were merely transfers, from the list of cases, as was done at this office with the records of the Chimborazo Hospital. It is impossible to tell how many of the 10,968 cases of fever in the seven hospitals were due to transfers during convalescence; but were the number known and deducted from the total the percentages of fatal cases would no doubt be very different from those tabulated. The figures in the last column are of little value for purposes of comparison, as deaths from wounds, of necessity a very variable number, are included in the thousand deaths which form the basis of the calculation.

† *Supra*, p. 35. ‡ *Supra*, p. 34.

IV.—AMONG THE CONFEDERATE SOLDIERS, PRISONERS OF WAR.

In Table XIX* the annual rates of prevalence and mortality of these fevers among the rebel prisoners were stated as 31.4 and 13.6 respectively per thousand prisoners. But these numbers do not include the fevers reported as typho-malarial. When the 37.6 cases and 4.8 deaths returned as the annual prison rates of this fever are added to those of typhoid, typhus and common continued fever, the rates for these fevers as a class become 69.0 and 18.4, smaller than the average annual rates of the rebel troops on active service but larger than those of the Union forces.

The following table exhibits the statistical relations of the continued fevers at certain of the prison depôts:

Table L.

Number of Cases of the Continued Fevers, with the resulting Mortality, reported from the principal Prison Depôts as having occurred among Confederate Prisoners of War, with the annual rates per 1,000 of strength.

	Camp Douglas, Ill., Feb., 1862, to June, 1865.	Alton, Ill., Sept., 1862, to June, 1865.	Rock Island, Ill., Feb., 1864, to June, 1865.	Camp Morton, Ind., June, 1863, to June, 1865.	Johnson's Island, Ohio, June, 1863, to June, 1865.	Camp Chase, Ohio, Feb., 1864, to June, 1865.	Elmira, N. Y., July, 1864, to June, 1865.	Fort Delaware, Del., Aug., 1863, to June, 1865.	Point Lookout, Md., Sept., 1863, to June, 1865.	Total at the nine principal depots.
Average number of prisoners present	5,361	1,008	6,030	2,865	2,114	3,570	6,591	6,406	9,610	40,815
Cases:										
Typhoid	1,114	185	51	54	93	115	235	414	265	2,526
Typhus		5	1	1			4	(b) 18	2	31
Common Continued	2									2
Typho-malarial	163	722	10	506	54	3	2	1,574	35	3,069
Total Continued Fevers	1,279	912	(a) 62	561	147	118	241	2,006	302	5,628
Deaths from—										
Typhoid	351	67	32	41	26	83	140	156	216	1,102
Typhus		3	2	1					1	7
Typho-malarial	51	122	12	98	4	6	1	91	1	389
Total Continued Fevers	402	192	[illegible]	140	30	62	141	247	218	1,498
Numerical ratio per 1,000 of strength for the cases of—										
Typhoid (including Typhus and Common Continued)	69.9	66.5	9.1	9.2	21.1	22.7	36.3	35.2	17.1	31.4
Typho-malarial	8.9	272.8	1.2	84.8	12.3	.8	.3	128.2	2.9	37.6
Total Continued Fevers	79.8	341.3	7.3	94.0	33.4	23.3	36.6	163.4	17.1	69.0
For the deaths from—										
Typhoid (including Typhus and Common Continued)	15.2	24.5	6.3	7.1	5.9	16.4	21.2	12.7	12.3	13.6
Typho-malarial	2.8	42.7	1.4	16.4	.9	1.8	.2	7.4	.1	4.8
Total Continued Fevers	22.4	67.2	7.7	23.4	6.8	18.2	21.4	20.1	12.4	18.4

(a) The number of cases registered as diarrhœa, dysentery, or other diseases, and returned as the continued fevers on the occurrence of a fatal issue, has more than [illegible] to the number of cases of these fevers.

(b) In these cases the deaths, in accordance with [illegible] to typhus, the fatal cases of the [illegible] remaining undetermined.

* *Supra*, p. 47.

Of the 5,628 febrile cases noted in this table 44.9 per cent. were reported typhoid, 54.5 typho-malarial and only 0.6 typhus. Of the cases reported as typhoid and typhus 43.3 per cent. were fatal; of those regarded as typho-malarial 12.7 per cent.; of the whole number of febrile cases 26.6 per cent.

Typhoid, notwithstanding the smaller number expressing the totality of its cases, was the prevailing fever at two-thirds of the depôts. Typho-malarial predominated at Alton, Camp Morton and Fort Delaware; but on account of the uncertainty attaching to the nature of these cases the large annual rates at Alton, 319.3 cases and 67.2 deaths per thousand of the average strength, cannot be accepted as indicating a typhoid epidemic of unusual virulence within the walls of the prison. The frequent changes in the constituents of the average number present must be remembered, in connection with these high rates, as modifying and materially reducing them.* The deaths, which numbered 16.9 per cent. of the typho-malarial and 36.8 of the typhoid cases, imply a doubt of the presence of typhoid in many of the cases of the former series. Indeed, had this camp experienced an epidemic of typhoid or other continued fever due to its insanitary conditions, the fatality of its febrile cases would have been greater instead of considerably less than that of the continued fevers in the prisons generally. The percentage of fatal cases at Alton was 21.0; in the nine prisons tabulated the percentage was, as already stated, 26.6. But as malarial fevers were prevalent at this point, in the apparent absence of local conditions for their development, it is probable that many of the typho-malarial cases, which constitute nearly four-fifths of the whole number on the record, were adynamic remittents imported from southern fields of service.

The comparative infrequency of the continued fevers among the prisoners on both sides, notwithstanding the insanitary elements of their environment, which included the presence of the typhoid poison, must be ascribed to the same cause that preserved the camps of the veteran armies from visitation—a want of susceptibility on the part of the individuals composing the aggregation.

II.—CLINICAL RECORDS OF THE CONTINUED FEVERS.

The clinical records of the continued fevers are, as might be expected, contained principally in the case-books of the various general hospitals. Field reports treated of such cases only in exceptional instances, as when, during winter quarters, a medical officer retained his typhoid cases rather than expose them to the dangers attending transportation to a distance. Usually, however, cases of enteric fever were sent from the field on the first favorable opportunity.

The recorded cases, as a rule, are more or less imperfect. On arriving at the general hospital the patient was frequently unable to give an account of the early history of his case. In some hospitals no attention was paid to the clinical records. In others the case-books were kept, but in so perfunctory a manner that they show little to indicate the nature of a particular case other than the entry of the disease as determined by the examination on admission and some fragmentary details of the medication prescribed. Fortunately, however, some of these books were carefully kept, and from them ample materials may be gathered for a representation of the continued fevers as they were seen and treated by our

* See *supra*, p. 62.

medical officers during the war. For to obtain a clear view of the subject the study of a large number of cases is needful, not only to supplement the incomplete details of one case by those of another, but chiefly because of the variety presented by the cases. A certain aggregation and sequence of symptoms might be selected for presentation as illustrative of a certain grade and type of the febrile manifestations, but such an arrangement would be purely artificial and arbitrary. Some medical officers refer briefly to their cases on the medical descriptive lists as having been typical instances of the fever as diagnosticated. This was due either to a limited experience or to preconceived views of the general nature of the disease. There were in fact no typical cases: the fevers presented an infinite variety. As has been seen, even the line separating the paroxysmal from the continued fevers was not defined, and among the latter every gradation was found, from the mild attack in which the patient hardly recognized that he was sick, and the abortive case with its early convalescence, to that in which a fatal issue appeared from the beginning to be the only probable termination; and from the cases which progressed with some regularity toward their favorable or unfavorable ending, to those which were beset with alternations of hopefulness and uncertainty, prolonged for months by the continuance of intercurrent or the supervention of sequent disease. Only a few of the mild or abortive cases are detailed in the case-books. Such cases were treated in the field, where clinical records were not kept. When they occurred in the general hospitals they seem, owing to the prevalence of more serious cases, to have reached their termination without attracting special attention, and the diagnosis *typhoid*, entered probably on a mental review of the history, constitutes their only record.

I.—COMMON CONTINUED FEVER.

To the same causes which possibly account for the absence of details in mild cases of typhoid fever may be attributed the absolute want of clinical records in cases of common continued fever. Although no less than 11,898 febrile cases, 147 of which proved fatal, were reported under this heading during the first fourteen months of the war, no official record has been preserved of the symptoms and progress of any one of them. When details of febrile cases are recorded in the case-books, the diagnosis is typhoid fever. But among the *Medical Descriptive Lists* there is one case which appears as *simple continued fever*. Remissions are definitely acknowledged as having occurred in this case.

Private William R. Snyder, Co. G, 26 N. C. Troops, was admitted August 8, 1863, as a case of simple continued fever. He had been left on the field at the battle of [illegible] Run's wound unhealed. About August 1 he was seized with severe headache and loss of appetite. On admission he was very feeble: pulse 120 and weak; tongue moist but with a brown fur in the centre; skin hot and dry; bowels constipated. On the 15th the fever subsided by the occurrence of remissions: the patient's bowels were alternately loose and constipated. By September 1 he was considered fit to be sent away, having been able to walk about the grounds for the previous ten days. He was treated with small doses of quinine, spirit of nitre and blue-pill.—*Asst Surg. H. C. May, 145th N. Y. Vols., Hospital, Gettysburg, Pa.*

There are also on these lists thirty-seven febrile cases which were reported as *continued fever*.* These are all of a later date than the order calling for the disuse of the term *continued fever*, and may therefore be regarded as contributions to the clinical history of that fever furnished by officers who were unacquainted with the requirements of existing orders. Unfortunately most of the descriptive lists are barren of information except as to

* [illegible] the specimen, now the property of the museum membrane of the large intestine, was submitted by Dr. WOODWARD as No. [illegible] and figured [illegible] in the [illegible] [illegible] [illegible]

dates of admission and of recovery or death, with or without notes of treatment. Of these cases seven, which give more or less testimony as to the condition of the patient, are herewith submitted:

CASE 1.—Private Benjamin Midler, Co. G, 147th N. Y. Vols.; age 16; was admitted June 18, 1863, with a severe attack of continued fever which had lasted two weeks. He is reported as improving slowly on the 26th; as markedly improved on July 2, and as returned to duty August 8.—*Act. Ass't Surg. T. Turner, U. S. Army, 3d Division Hospital, Alexandria, Va.*

CASE 2.—Private J. E. Vosburg, Co. H, 137th N. Y. Vols.; age 18; was admitted June 17, 1863, in the advanced stage of an attack of mild continued fever. On the 20th the tongue, which had been slightly brown and dry, became clean, the febrile excitement abated and the appetite returned. He was returned to duty July 1.

CASE 3.—Private Charles Robinson, Co. I, 137th N. Y. Vols.; age 21; was taken while in camp, June 7, 1863, with continued fever of a mild type. On admission on the 17th he complained of severe headache, and his tongue was slightly brown in the centre and red on the edges. On the 21st he had diarrhœa; but was convalescent on the 26th, and returned to duty July 6. He was treated with diaphoretics, opiates and astringents.—*Act. Ass't Surg. Benjamin Wilson, U. S. A., 3d Division Hospital, Alexandria, Va.*

CASE 4.—Ass't Engineer Jas. Flinn, U. S. Navy; age 22; was admitted July 14, 1863, having been sick for fourteen days with continued fever. He had slight delirium at night and a diarrhœa of six or eight light-colored stools daily; but there was no tenderness of the abdomen. The tongue was white furred; appetite deficient; he had a slight bronchial cough. He took a mixture of dilute phosphoric acid and ipecacuanha, and was sponged over the whole surface of the body twice daily with cold sea-water. He was able to be up on the 18th, and was returned to duty August 1.—*Act. Ass't Surg. T. H. Liebold, U. S. A., Hospital, Point Lookout, Md.*

CASE 5.—Private Sherman Hopkins, Co. L, 6th Mich. Cav.; age 30; was admitted September 8, 1864, with continued fever. On the 12th the patient is reported as presenting all the symptoms of typhoid fever and as being much reduced. He had muttering delirium, slight diarrhœa and great tenderness over the abdomen; tongue thickly coated; teeth covered with sordes; pulse 136. He seemed to improve a little for a day or two; but during the afternoon of the 14th he began to gasp for breath and his extremities became cold. He died next morning.—*Act. Ass't Surg. W. Kempster, U. S. A., Patterson Park, Baltimore, Md.*

CASE 6.—Private Benjamin Shuester, Co. D, 2d Mass. Cav.; age 23; a paroled prisoner from Savannah, Ga., was admitted December 19, 1864. He was much emaciated, and complained of headache and soreness in his bones. He had a chill on the 25th; was restless during the night, and next day his bowels were loose; pulse 125; eyes red; face flushed; skin dry; tongue coated and tremulous. The diarrhœa continued severe until the end of the month and was accompanied with much abdominal pain. On January 2, 1865, the patient became drowsy; on the 5th a petechial eruption was observed on the chest and abdomen; there was much tympanites and great tenderness of the bowels; pulse 120; respirations 38. On the 8th the tongue was dry and covered with sordes and thin watery passages came from the bowels. He became delirious on the 11th, and from the 12th to the 15th, when he died, he was moaning constantly.—*Act. Ass't Surg. H. A. Maughlin, U. S. A., Annapolis, Md.*

CASE 7.—Private J. L. Austin, Co. D, 37th N. C.; age 25; was admitted from Fort Delaware October 16, 1863, having been taken sick with continued fever about a week before his arrival. He suffered from pains in his right foot and thigh, probably connected with an open sore of gangrenous appearance near the roots of the toes; these pains occurred in severe paroxysms and prevented sleep. By the 28th the local inflammation was subdued, but the fever became aggravated in the evenings. After this he became much debilitated; his tongue was moist but red in color, subsequently becoming dry and brown; and he had a diarrhœa of about three stools in the twenty-four hours. By November 16 he was greatly emaciated, and on this day he had twitchings of the muscles and involuntary discharges. Death took place on the 19th.—*Act. Ass't Surg. W. A. Harney, U. S. A., Point Lookout, Md.*

II.—TYPHO-MALARIAL AND TYPHOID FEVERS.

The bedside records of typho-malarial fever are represented in the case-books by but three cases, which, moreover, do not appear characteristic of the diseased conditions for which the name was suggested; for in the first there is, in view of our knowledge of the symptomatology of malarial fevers, a remittent fever with nothing to indicate a specific typhoid, in the second, another remittent, but of a graver type, and in the third, as will be seen hereafter, a typhoid fever with nothing in the record to indicate a malarial complication.

CASE 1.—Sergeant Egbert H. Little, Co. A, 38th Wis. Vols.; age 20; was admitted July 26, 1864. About July 1 he contracted diarrhœa, which yielded to treatment; on the 14th he had severe headache followed by a decided chill, and afterwards by high fever, which recurred daily for a week. On the 17th he was admitted to the 3d Division Hospital of the Ninth Army Corps, and on the 22d transferred to this hospital, arriving as above stated. He was very feeble, and had a tendency to low fever every afternoon; his bowels were constipated and appetite lost. A ten-grain dose of blue-mass was given on admission, and three grains of quinine with tincture of iron were prescribed for administration three times a day. On August 7 he continued to have headache and fever every afternoon,

and his bowels were constipated and appetite poor. On the 21st the quinine was omitted; three compound rhubarb pills were given, and neutral mixture and acetate of ammonia prescribed for use every three hours. The diaphoretic mixture was omitted on the 25th, and the iron and quinine resumed. After this the patient improved gradually and was returned to duty October 18.—*Satterlee Hospital, Philadelphia, Pa.*

Case 2.—Private William Smith, Co. K, 154th Ind. Vols.; age 24; was admitted June 24, 1865, with typho-malarial fever. He had been sick for ten days with constant nausea and frequent vomiting of dark-green bile, headache, pain in the loins and diarrhœa; his tongue was large, flabby and coated with a thick brown fur; pulse 90, soft and compressible; skin dry. The diarrhœa continued, coma supervened, and on the 30th convulsions were followed by death.—*Cumberland Hospital, Md.*

Case 3.—Private David Markly, Co. A, 126th Ohio Vols.; age 23; was admitted September 3, 1863. He was attacked with typho-malarial fever in camp at Castle Garden, New York, on August 31, but the symptoms were not very marked. Quinine and milk diet were ordered. A diarrhœa of five or six stools daily set in on the 4th, and slight delirium on the 6th. Sudamina appeared on the 9th, on which day there was bleeding from the nose. Milk-punch and beef-tea were prescribed. There was a slight papular eruption on the 10th, and rose-colored spots on the 13th. The diarrhœa had meanwhile abated and the general condition of the patient improved. Convalescence was uninterrupted; he was returned to duty November 29.—*Central Park Hospital, N. Y.*

In addition to these there are among the medical descriptive lists thirty-seven cases reported as typho-malarial fever. Twenty of these are destitute of value as they give no statement of the actual condition of the patient; the others are given below. In 1 and 2 the fever had subsided before admission, as also in case 3, in which a diarrhœal sequel proved fatal. Cases 4–8 were mild febrile attacks which, before the introduction of the new term, would have been recorded as common continued fever: there is nothing in the record of case 4 to exclude a diagnosis of mild remittent fever, especially if the patient had been exposed to malarial influences; but cases 5–8, in the Central Park Hospital, were evidently mild attacks of typhoid fever. The Fairfax Seminary cases, 9–12, represent the last stages of typhoid fever or of an adynamic remittent without the presence of specific typhoid, if the existence of such a diseased condition be admitted. Cases 13–16, in the Douglas and Stanton Hospitals, show more distinctly the presence of a malarial element. Case 17 was apparently a pernicious malarial fever.

Case 1.—Private R. L. Keeth, Co. D, 7th Conn. Vols., was admitted Sept. 28, 1863, with typho-malarial fever. When admitted he was weak, but the fever had subsided, the tongue was cleaning and the appetite improving. On October 14 he was placed on light duty and recommended for transfer to the Invalid Corps on account of an oblique inguinal hernia.

Case 2.—Private B. Earl, Co. H, 142d N. Y. Vols., was admitted Oct. 1, 1863, with typho-malarial fever. The fever had subsided but the patient was greatly debilitated, and there was general œdema and effusion into the peritoneal and pleural cavities. One grain of iodide of iron and two grains of powdered squill were given every six hours in the form of pill. This course was continued until November 1, when the patient was reported as doing very well—his bowels regular, secretions normal, appetite good and effusion removed. He was returned to duty November 24.—*Charles T. Reber, Act. Ass't Surg., U. S. A., Hospital No. 14, Beaufort, S. C.*

Case 3.—Sergeant Thomas Julien, Co. I, 62d N. Y. Vols.; age 27; was admitted June 14, 1863, with typho-malarial fever. He had diarrhœa and was somewhat emaciated, but slept well. On July 20 the diarrhœa became uncontrollable, the matters passed being thin and slimy. Death occurred August 2.—*Act. Ass't Surg. M. H. Picot, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 4.—Private John Roach, Co. C, 26th Pa. Vols.; age 16; was admitted Oct. 9, 1863, with typho-malarial fever. He complained of weakness, loss of appetite, pains in the back and limbs and fever at night; his pulse was feeble, tongue coated and bowels regular. He was able to be up on the 15th, and was returned to duty on the 27th. Treatment consisted of tonics, quinine and milk diet.—*J. P. Rossiter, Act. Ass't Surg., U. S. A., 2d Division Hospital, Alexandria, Va.*

Case 5.—Private Elam Dye, Co. H, 126th Ohio Vols.; age 21; was admitted Sept. 5, 1863, with typho-malarial fever, with which he had become affected seven days before admission. His fever was continued. He had no chills nor eruption; his tongue was furred but moist; skin hot and dry; bowels constipated. He had headache but his mind was not affected. A slight bronchitis retarded his convalescence. He was returned to duty November 29.

Case 6.—Private Hector S. Hunt, Co. D, 126th Ohio Vols.; age 22; was admitted Sept. 5, 1863, with typho-malarial fever. A week before this date he had been attacked while in camp at the Battery, New York, with fever followed by diarrhœa. The fever lasted only for two or three days after admission, but the diarrhœa continued until the 10th. After this he was placed on light duty. He gained strength rapidly, and was returned to field service October 15.

Case 7.—Private William Craig, Co. H, 126th Ohio Vols.; age 21; was admitted Sept. 5, 1863, with typho-malarial fever, having had continued fever without diarrhœa for eight days before his admission. He had slight

headache and much pain in the back and limbs; his skin was hot and dry; tongue moist and lightly furred; pulse 88; bowels regular; there was no eruption. He had some delirium during the night on the 8th and 9th, but after this his case progressed favorably. He was treated with quinine, pills of rhubarb and soda, milk-punch, and tepid sponging of the body and limbs. He was returned to duty November 29.—*S. Teats, Act. Ass't Surg., U. S. A., Central Park Hospital, N. Y.*

Case 8.—Private David A. Maskley, Co. A, 126th Ohio Vols.; age 23; was admitted Sept. 3, 1863, with typho-malarial fever. He had been sick in camp at Castle Garden for seven days before admission. He had diarrhœa from the 4th, and afterwards slight delirium. Epistaxis occurred on the 9th, on which day sudamina appeared. A slight papular eruption, which faded somewhat under pressure, but which did not seem to be the specific eruption of typhoid fever, was discovered on the 10th. The typhoid eruption, however, was well marked on the 13th. The diarrhœa ceased on the 17th, after which convalescence was progressive. He was treated with quinine, camphor and opium, and milk-punch. He was returned to his command November 29.—*S. Smith, Act. Ass't Surg., U. S. A., Central Park Hospital, N. Y.*

Case 9.—Sergeant William H. Smith, Co. B, 6th Md. Vols.; age 25; was admitted August 19, 1863, as a case of typho-malarial fever. He was much exhausted by the fatigues of his journey to hospital; pulse 120, feeble and vibrating; skin dry; bowels very loose, but not tender; lips and teeth covered with sordes. Delirium and subsultus tendinum set in on the 22d, with involuntary passages and some tenderness of the bowels. On the 26th he appeared to be improving, being at times rational, but the prostration increased and death occurred on the 30th. The treatment consisted of the administration of neutral mixture, acetate of lead and opium, small doses of quinine, turpentine emulsion and milk-punch; the general surface was sponged repeatedly with diluted alcohol, and mustard was applied to the abdomen.

Case 10.—Private George W. Hamilton, Co. G, 6th Md. Vols.; age 22; was admitted August 19, 1863, in a dying condition from typho-malarial fever. He had diarrhœa with involuntary stools, fulness and tenderness of the abdomen and sordes on his lips and gums. He became delirious on the 21st and much prostrated. He died next day. Neutral mixture, astringents, stimulants and sponging with warm water and alcohol were used in the treatment.—*George S. Bennett, Act. Ass't Surg., U. S. A., Fairfax Seminary, Va.*

Case 11.—Private Alfred Chase, Co. F, 35th N. J. Vols.; age 19; was admitted May 16, 1865, with typho-malarial fever. He had been ailing for some days prior to admission, but had not been confined to bed. In a few days, however, cerebral symptoms set in, accompanied with a profuse diarrhœa, and the patient sank rapidly, dying on the 23d. He was treated at first with acetate of ammonia and afterwards with moderate doses of quinine, opiates and stimulants.—*J. D. Smith, Act. Ass't Surg., U. S. A., Fairfax Seminary, Alexandria, Va.*

Case 12.—James McQueen, unassigned recruit, was admitted May 19, 1865, with typho-malarial fever. He was received from the provisional camp, Virginia, in a critical condition. His sickness had lasted ten weeks. When admitted he was under the influence of a chill, which was followed by fever and profuse perspiration. He was delirious most of the time. His tongue was coated and very red; bowels regular; pulse 110 and feeble, and he experienced much difficulty in urinating. Three grains of quinine and Dover's powder were directed to be given every three hours, and twenty grains of calomel at night, followed by a full dose of castor oil and opium in the morning. Brandy was added to the treatment on the 22d, on which day the fever and perspirations continued, with difficulty of swallowing and much gastric irritability. Hiccough and subsultus tendinum appeared on the 23d, with increasing perspiration and involuntary passages on the 26th. He appeared a little better on the 27th, taking some nourishment, although the delirium and the involuntary passages continued. Death took place on the 29th.—*Fairfax Seminary, Va.*

Case 13.—Private Daniel McCumber, Co. H, 26th Mich. Vols., was admitted November 4, 1863, with typho-malarial fever. The patient was incoherent, constantly endeavoring to get out of bed. He had fever of a remittent type and diarrhœa; pulse 120; respiration feeble. He perspired freely at times, but the delirium continued, the pulse became weaker, and death took place on the 13th.—*P. R. Holly, Act. Ass't Surg., U. S. A., Douglas Hospital, Washington, D. C.*

Case 14.—Sergeant Horace Hammond, Co. F, 124th N. Y. Vols.; age 36; was admitted June 14, 1863, with typho-malarial fever. The patient had suffered with slight chills and feverishness, recurring several times during the day, for several days following June 8. On admission he had no intermittent symptoms and the case was supposed to be incipient typhoid, but its mixed character soon became evident. He was treated with milk-punch and beef-essence, to which, on August 22, quinine was added at the rate of sixteen grains daily. At the end of three weeks he was able to walk about, although weak and having a slight diarrhœal tendency. He was returned to duty August 24.—*C. C. Lee, Ass't Surg., U. S. A., Douglas Hospital, Washington, D. C.*

Case 15.—Private James Wheeler, Co. I, 141st N. Y. Vols.; age 29; was admitted July 26, 1863, with typho-malarial fever, having been sick since the 19th with fever of a typhoid type. The tongue was red and moist; the pulse frequent and feeble; the bowels loose and tender. He was treated with opiates and aromatic sulphuric acid. On August 2 there was a distinctly marked remission; but the diarrhœa continued and the patient became enfeebled. Quinine was given. Perspirations and remissions recurred, but delirium set in on the 7th and death took place on the 10th.

Case 16.—Corporal N. K. Stille, Co. A, 168th N. Y. Vols.; age 19; was admitted July 28, 1863, with typho-malarial fever. He had been sick since the 22d with headache, pain in the back and bowels, and diarrhœa. His pulse was frequent and full and tongue coated and dry, but with red edges. He had remissions with profuse perspirations at the end of the month, having been taking quinine meanwhile in doses of ten to thirty grains daily; and during the first week of August he had some febrile movement every afternoon; but his tongue became moist and

dent and his bowels constipated. On August 22d he was sent to New York for muster out.—*George A. Mursick, Asst. Surg., U. S. A., Stanton Hospital, Washington, D. C.*

Case 17.—Private John Ennis, Co. E, 9th N. Y. Cav.; age 19; was admitted on the afternoon of May 4, 1864, with [illegible]. Surgeon R. M. Tease of the 9th N. Y. Cav. stated that the patient had been sick for three days. He had delirium with stupor and subsultus tendinum; his pulse was rapid and full and his tongue coated with a long yellow fur. He continued in low delirious condition until death at 3.30 A. M. of the 6th. Stimulants and nourishment given, and a fly-blister was applied to the nape of the neck.—*J. M. Wallack, Act. Ass't Surg., U. S. A., Hospital No. 6, Beaufort, S. C.*

[illegible]le of these cases, and a few clinical notes to be presented hereafter in connection with the post-mortem records, there has been filed in this office nothing that will indicate the probable history of the 37,480 cases (white 29,871, colored 7,529) reported as typho-malarial fever during the period extending from June 30, 1862, to June 30, 1866.

Seminary Hospital cases.—The case-books of the Seminary Hospital, Georgetown, D. C., were kept with much care during the autumn and winter of 1861, while the establishment was under the supervision of Surgeon Joseph R. Smith, U. S. A. These books contain the clinical notes of forty cases received from the Army of the Potomac. As the term typho-malarial had not been introduced at this time, the cases were entered on the rolls as typhoid or remittent, in accordance with the views then held by the attending surgeons as to the symptomatology of the many fevers. Later in the war the relative proportion of these fevers greatly changed the percentage of pure typhoid cases undergoing a [illegible] partly from an actual decrease in prevalence and partly from the complication of the typhoid manifestations with those due to a more extensive prevalence of malarial disease among the troops; but there are no grounds for supposing that the fevers which occurred [illegible] June 30, 1862, differed in type from those that occurred immediately before that date. An examination of the records of the Seminary Hospital will therefore show, among the typhoid and remittent fevers, those which at a later date would have been reported as typho-malarial, in accordance with the views of the late Dr. Woodward.

The case-book contains the histories of *one hundred and twenty-three* cases of fever. The entries were made daily, and in some instances twice a day, at the morning and evening visits. The utmost care appears to have been taken in recording every thing of note in connection with each case; but this very minuteness renders the records unpresentable in their original form, as a work of this kind; the continued repetition of the condition of the skin, tongue, pulse etc., and the persistence of cerebral, pulmonary and intestinal symptoms, day after day in the records, while giving the cases their value, render them unnecessarily tedious. As presented below they appear in a condensed narrative form, care having been exercised to omit no statement which tends in any way to convey an appreciation of the patient's condition. They have been arranged as follows:

[illegible] cases of fever, entered as *typhoid*, in which there is no ground for acknowledging the presence of a [illegible]. Two of these were fatal.

Seven cases of fever, entered as remittent, in which there is nothing to indicate the presence of the typhoid poison. None of these terminated fatally.

[illegible] entered as typhoid, in which the records give more or less evidence of the coexistence of [illegible]. Seven of these were fatal.

[illegible] entered as typhoid, in which a remittent fever preceded the development of the symptoms which confirmed the diagnosis. Seven of these were fatal.

[illegible] cases, entered as *typhoid*, in which remittent fever seemed to precede or accompany the typhoid manifestations. One of these proved fatal.

Eight cases, entered as remittent, in which the records give more or less evidence of the coexistence of the typhoid poison. One fatal result among these.

[illegible] cases, entered as *typhoid*, but in which the malarial disease only is prominent.

One case, entered as typhoid fever, which was probably a case of pericarditis.

This classification of the fever cases of the Seminary Hospital is the result of a careful analysis of the history of each. The symptoms apparently regarded as characteristic of typhoid fever by our medical officers were separated from the aggregate, while holding in view the clinical phenomena of malarial fever as deduced from the cases presented in the third chapter of this volume. A defined periodic character of the chills, fever or perspirations, epigastric pain, gastric irritability, hepatic tenderness, jaundice, densely coated or large and flabby tongue, constipation or, concurrent with diarrhœa, an umbilical or general abdominal tenderness, and a manifest influence of quinine on the febrile condition, were regarded as indicating the presence of the malarial poison in the system. Certain symptoms in the Seminary Hospital cases appeared common to both forms of fever, either as the result of the febrile action or of the specific influence of its cause. Increased heat, circulatory excitement, diminished secretions, cerebral disturbance amounting to delirium, stupor or coma, hemorrhagic extravasations or other general manifestations of a depraved condition of the blood, were therefore excluded from consideration as indefinite in their indications. There remained a set and sequence of symptoms, to be particularized hereafter, which our medical officers evidently regarded as pathognomonic of typhoid fever.

Of the one hundred and twenty-two cases in the records of this hospital, excluding the case of mistaken diagnosis, one hundred and seven were regarded as typhoid and fifteen as remittents by the physicians in attendance. But on arranging them in accordance with a typho-malarial symptomatology, there are found to be fifty-one cases of typhoid fever, seven of remittent and sixty-four of typho-malarial fever, fifty-six of the last having been drawn from the record of typhoid cases and eight from that of the malarial fevers.

The fifty-one typhoid cases furnished ten deaths or 19.6 per cent., and the sixty-four typho-malarial cases sixteen deaths or 25.0 per cent.; none of the pure remittents died. These results differ markedly from the percentages obtained from the numerically reported cases. As may be seen by Table XLII, typhoid fever during the war gave a mortality of 35.9 in every hundred cases, while typho-malarial fever was credited with only 8.14 per cent. of fatal cases.

Although fifty-six of the sixty-four cases of typho-malarial fever were reported as typhoid, it is evident, from the record of treatment, that the medical officers were not ignorant of the presence of the complication nor of the importance of removing it by specific medication. But as malarial fever gave a small mortality and typhoid fever a large one, the more dangerous disease was naturally entered on the record as the diagnosis. These cases illustrate the true typho-malarial fever of the autumn of 1861, as well as those which occurred at a later date: but it is manifest, from the mortality rates to which reference has been made, that they do not give information concerning all the classes of cases which were afterwards reported as typho-malarial.

Fifty-one Typhoid Cases.

Case 1.—*An incomplete record.*—Private Henry A. Hitchcock, Co. B, 3d Vt. Vols.; age 25; was admitted Oct. 1, 1861, as a case of typhoid fever. On the 2d he was dull, stupid, deaf, and had fulness of the head, tinnitus aurium and some delirium and subsultus; his skin was hot and dry; tongue pale, red at tip but coated gray in the centre; he had also some diarrhœa, slight tympanites and acute iliac tenderness. Quinine was given. Next day the skin was moist and but one stool was passed; the acute tenderness continued. He was returned to duty on the 28th.

Case 2.—*A light febrile attack, unmarked by specific symptoms.*—Private Fospeld Black, Co. C, 1st Long Island Vols., was admitted September 14, 1861, having been sick for twelve days. The disease began with chills, which were followed by fever, pain in the head and bones, buzzing in the ears, epistaxis, anorexia and weakness. On admission he slept well after a bath, and next morning his tongue was coated yellowish-white, skin hot but moist, bowels regular; he was a little drowsy and had some cough. Dover's powder was given at night. He rested well,

and on the 16th had a good appetite and quiet bowels, but his tongue was white. Castor oil produced two stools. No further medication was required. His tongue became clean. He was returned to duty on the 30th.

Case 3.—*Slight intestinal symptoms and rose-colored spots, but progress not reported in detail.*—Private Joseph Caldwell, Co. K, 9th Pa.: age 21: was admitted September 19, 1861, as a case of typhoid fever. He had been sick for a week, at first with chills and afterwards with pain in the head and bowels. Diarrhœa and fever, which last were worse in the evening and on alternate days. He had taken but little medicine. On the day of admission he had six stools, with tenderness in the right iliac region and rose-colored spots on the chest and abdomen. Stopping at present the pulse was 74 and strong: the skin warm and moist: the tongue smooth, fissured, red, dry, quite clean anteriorly but with a brown fur posteriorly. On the 20th the eyes were suffused, the cheeks flushed, the pulse 96 and full, skin dry and warm, the tongue dry, brown and fissured: epistaxis, anorexia, thirst, etc. The fetid stool and slight tenderness of the abdomen are also noted. The details of the case are not recorded. The patient was returned to duty October 20.

Case 4.—*Weakness, giddiness, drowsiness, perspiration, sudamina and rose-colored spots.*—Private James F. Tomb, Co. H, 12th Pa.: age 19: had headache, weakness and diarrhœa on August 28, 1862, and was admitted September 4 as a case of typhoid fever. On the morning of the 5th there was slight fever, the pulse 87, weak, the skin dry and hot, the tongue red, flabby and coated. Quinine was ordered with Dover's powder at night. He passed a restless night, the night, and next day had no fever; pulse 72, tongue heavily coated, skin warm and moist, bowels slightly relaxed; nor did the fever recur in the evening. The following is the daily record of observations in this case: 6th, Morning: rested well: pulse 62: tongue heavily coated: skin warm and moist: one stool: no fever. Evening: pulse 72: skin warm and dry: tongue very red, coated white: one stool: no fever. One and a half grains of Dover's powder. 7th, Morning: rested well; pulse 76; drowsy; tongue coated brown, red at tip: skin warm, natural; bowels quiet: appetite fair. Evening: pulse 60; skin warm and moist; no fever; tongue slightly coated; bowels quiet: appetite good. 8th, Morning: rested well; drowsy; pulse 56, weak; tongue pale, slightly coated white: skin cool, moist: no fever; giddiness; bowels quiet; appetite fair; walking about. Evening: pulse 50; tongue coated, pale: skin cool, moist; appetite good; stronger; bowels quiet; sleepy. 9th, Evening: sleepy: pulse natural; tongue pale; one thin small stool; skin natural. 10th, Morning: rested well; slept much; pulse 102, strong; tongue coated white, moist: skin moist, warm; rose-spots; profuse sudamina; bowels natural. Gave wine of cinchona. Evening: pulse 85 when standing; skin warm and dry; tongue slightly coated; profuse sudamina: one large stool. 11th, Morning: rested well; pulse 88, sitting; tongue pale, coated at base; skin cool; sudamina profuse; three stools: no pain: appetite good; no rose-spots. Evening: walking about; some weakness; profuse sudamina. Ordered rest. 12th, Morning: rested well; pulse 78, quick, compressible; tongue slightly coated gray; skin warm, moist; no fever: profuse sudamina; no tenderness; one large stool; walking around; weak. Evening: pulse 80, sitting: tongue pale, slightly coated grayish: skin natural, covered with sudamina: one natural stool: appetite good. 13th, Transferred to hospital at Baltimore, Md.

Case 5.—*The mind continued affected after the other symptoms had disappeared.*—Private Charles Whitfield, Co. B, 1st Mich.: age 25: admitted March 2, 1862. Diagnosis—typhoid fever and chronic bronchitis. On the 1st he was quite deaf, drowsy and delirious: he was hoarse and had a frequent cough, with free expectoration. His cheeks were hot and flushed, and he had much thirst; pulse rapid and weak; tongue somewhat dry, quite red and with enlarged papillæ: stools not frequent but loose; abdomen tender. Two watery stools were passed on the 5th. The tongue became moist on the 6th, the appetite returned and the bowels were quiet, but the other symptoms remained unchanged. On the 7th the deafness lessened and the hoarseness and cough diminished; pulse 90, good; skin natural: tongue moist, fissured, clean; bowels unmoved; but the mind continued affected for some time longer. On the 13th he replied naturally to questions, but had curious hallucinations which returned occasionally for several days after this, and the deafness continued for some days longer. During this time the bowels were regular or inclined to constipation. Milk-punch and tincture of iron were used. He was able to walk about on the 27th. On April 26 he was discharged for disability.

Case 6.—*Deafness; successive crops of rose-red eruptions; bowels quiet but for castor oil; skin moist; date of onset undefined.*—Private Charles Cheney, Co. G, 9th Pa. Vols. Admitted Sept. 19, 1861. Diagnosis—typhoid fever. No note of the case was taken until the 23d, when the patient was reported as quite weak and without appetite: his pulse 85 and quick: face flushed: eyes suffused: sense of hearing somewhat dulled: slight nausea, vomiting at times, which was not considered characteristic; tongue brown in the centre and moist at the edges: bowels quiet. Tincture of iron was ordered three times daily, turpentine emulsion every three hours and Dover's powder at night. He slept some during the night and perspired towards morning, when the eruption of the previous day was found to have disappeared and been replaced by an abundance of rose-colored spots; there was some borborygmus, but no stool and no tenderness or tympanites of the abdomen. The patient was thirsty and his tongue red, dry and slightly furred, but there was less deafness. In the evening castor oil was given, after which he slept badly and had five passages from the bowels during the night with some uncalled pain: he perspired profusely towards morning. During day the tongue was red, dry and glossy, and the eruption fading. On the evening of the 25th a mixture of iron and ammonia, quinine with Dover's powder. On the 26th the pulse was 80, the skin soft and natural, the eruption disappeared, the tongue yellowish and slightly furred, the appetite improved and the bowels quiet. Some rose-spots appeared on the 27th and 28th, disappearing on the 30th. The bowels remained unmoved from the 26th until the 31st, when there was one stool: after this they continued unmoved until October 7, when the natural issues —the patient's urine being in natural condition, his tongue clean but a little dry in the centre and his appetite good. He was transferred to Annapolis, Md., on the 10th.

Case 7.—*Drowsiness: abdominal symptoms slightly marked: rose-colored spots on 6th day: convalescent on 15th.*—

Private G. W. Beeman, Co. A, 4th Mich Vols.; age 19; was admitted Oct. 30, 1861. Diagnosis—typhoid fever. He had chills on the 25th, followed by fever and diarrhœa, for which quinine had been given. On the evening of admission he was drowsy, his face slightly flushed, pulse 85 and of good strength, skin dry and warm, showing a few rose-colored spots on the abdomen and chest, tongue red, smooth, dry and glossy, teeth blackened with sordes, bowels quiet; he had no appetite, some abdominal tenderness and gurgling, but no meteorism. Milk-punch, turpentine emulsion and beef-essence were prescribed on November 2. The skin became covered with sudamina on the 4th and the appetite was improved. A full dose of castor oil on this day produced one large evacuation. On the 7th the patient was looking bright and lively, and on the following day was up and walking about. He was transferred to Annapolis Md., on the 18th.

Case 8.—*Headache and dizziness; bowels quiet notwithstanding purgative medicines, but right iliac region tender; rose-spots on the 14th day, with convalescence succeeding.*—Corporal B. F. Gale, Co. A, 4th Mich.; age 20; was seized about Sept. 9, 1861, with weakness, pain in the head and back and fever, and was admitted as a case of typhoid fever. In the evening his pulse was found to be 92, quick and strong, skin natural, tongue red at tip but coated slightly in the middle, bowels quiet and appetite poor. Ten grains each of calomel and jalap were given. Next day the pulse was 74, the skin natural and moist, the tongue white in the centre and red at the edges, and the bowels quiet. Quinine was ordered. In the evening the pulse was 66 and the skin and tongue unchanged. One stool was passed in the morning; no tenderness. The patient had slight headache and dizziness. The bowels remained quiet during the following days, but some tenderness was manifested in the right iliac region. The skin continued warm and moist and the tongue unchanged, although the patient developed some appetite. On the 20th he was sitting up. On the 21st he had tinnitus aurium and some thirst, but the pulse was 64, tongue clean and appetite good. On the 22d a few rose-colored spots appeared, the patient's condition otherwise remaining unaltered. He was improving generally when, on October 1, he was transferred to hospital at Annapolis, Md.

Case 9.—*Deafness; dizziness, but mental faculties clear; diarrhœa; rose-colored spots on the 10th and 12th days, fading on 14th, when convalescence followed; to duty on 27th day.*—Private George N. Barber, Co. G, 14th N. Y.; age 18; was admitted Sept. 20, 1861, having been taken sick a week before with weakness, pains in the head, back and bowels, and epistaxis. Diagnosis—typhoid fever. On admission the pulse was 114, the skin hot and moist, the face flushed, the tongue gray in the centre and red at the tip and edges; there was diarrhœa, with irritability of the stomach and much tenderness in the right iliac region; the patient was sometimes affected with dizziness, but his mind was clear. Blue-pill was given. On the 21st he had five stools with persisting tenderness and gurgling, anorexia, a slight cough, epistaxis and deafness; his face was flushed, skin hot and moist, tongue red at tip, whitish-gray at base. On the 22d the epistaxis recurred; the tongue was dark-red at the tip, brown at the base, and its papillæ were prominent; the skin was warm and dry and presented one or two rose-colored spots; one stool was passed and the tenderness continued; pulse 76. Quinine in eight-grain doses was given three times daily, with morphia at night. The eruption faded next day, but appeared again on the 24th. The tongue began to clean on the 22d and the skin softened on the same day, after which, although the bowels continued relaxed and tender for a few days and the throat became slightly sore on the 27th, there was a steady improvement, and the patient was returned to duty October 9.

Case 10.—*Deafness; muscular twitchings; rose-colored eruption; abdomen tender, scaphoid; improvement after the second week.*—Private William Patterson, Co. K, 6th Wis.; age 28; was admitted Oct. 2, 1861, with typhoid fever. The condition of the patient is not stated until six days after admission, when his pulse was weak and compressible, 110; countenance haggard; cheeks sunken; eyes suffused; tongue slightly coated brown and very dry and fissured, as the mouth was open much of the time; he was very deaf and difficult to arouse; he spoke with much effort, and had exquisite tenderness in the epigastric and right iliac regions and spasmodic twitchings of the arms. Whiskey-punch was given every hour. Next day the eruption appeared over the abdomen and the tenderness was very much lessened; sinapisms were applied where the tenderness had been acute. The abdomen became scaphoid on the 10th, the tongue clean and very red, the face much sunken and the eyes suffused and surrounded by dark areolæ; pulse 104; the patient had much thirst, cough and hurried respiration. Next day the countenance was more natural and the tongue moist. On the 12th the expression was better, the eyes clearer, and there was less epigastric and umbilical pain. The sinapisms were repeated on this day. After this the patient gradually improved, although for some days the skin continued dry and husky, the bowels somewhat relaxed, about two thin stools daily, and the right iliac region slightly tender. On November 1, when he was transferred to Annapolis, Md., his pulse was natural, appetite good and bowels regular.

Case 11.—*Bronchitis prominent.*—Private J. Little, Co. H, 3d Mich. Vols.; age 26; was admitted October 19, 1861. Diagnosis—bronchitis. About October 12 he was taken with pain in the head, neck, back and limbs, and with loss of appetite. Throughout the progress of this case there was cough with much yellowish expectoration and some dyspnœa. Rose-colored spots appeared on the day of admission, and continued to erupt until the 30th. There was headache with dizziness, ringing in the ears and for a short time deafness; the tongue was moist, white in the centre and red at the tip and edges; the pulse was usually 80; the skin hot; the bowels relaxed, two to four stools daily being passed; the abdomen tympanitic and tender, especially in the right iliac and umbilical regions. On the 31st, on the disappearance of the eruption, the skin was of the natural temperature, so recorded for the first time: the tongue coated, but the appetite good; one stool was passed; there was slight headache, and the cough persisted, with asthmatic paroxysms at night. He was transferred to Annapolis, Md., on November 1, and discharged on the 13th on account of "fever."

Case 12.—*Symptoms generally not strongly marked; free rose-colored eruption from 7th to 18th day; dysuria from 20th to 28th day; convalescence rapid.*—Private J. E. Hollom, Co. H, 6th Me.; age 22; of large frame and stout habit, was taken about Sept. 3, 1861, with pain in the head, back and shoulders, slight fever, epistaxis and diarrhœa. He

was admitted on the 9th as a case of typhoid fever. The patient was weak; his tongue coated at the base, pale at tip and moist; skin hot and dry, showing a profusion of rose-colored spots; his cheeks were flushed, quite red, and he had cough and hoarseness, but his bowels were quiet. Dover's powder was given. He rested well, but next morning the fever ran high; pulse 104; skin hot and dry; face much flushed; tongue purple at the tip, coated, pale; large numbers of rose-spots on the abdomen, thighs and back, disappearing on pressure; one thin stool; borborygmus; anorexia. Squill and tartar emetic were given to allay the cough. In the evening the flushed condition of the face continued and the patient became drowsy,—pulse 108, but the skin began to be moist; four small thin stools were passed; but there was no abdominal pain, tenderness nor borborygmus. Next day the skin was perspiring and covered with rose-spots, the pulse had fallen to 92, and the patient's drowsiness was dissipated and his cough lessened; he had epistaxis. In the evening he sat up for a short time. On the 12th he had four small stools and some tympanites, but no pain nor tenderness. In the evening the face was flushed, eyes injected, skin hot and dry, but the mind perfectly clear. The diarrhœa abated gradually, and on the 15th he had one natural passage; on which day the skin was in natural condition, the tongue dark-red and slightly coated and the mind clear; the patient's face was flushed, and he had some cough and hoarseness; the rose-spots continued on the surface and did not disappear finally until the 20th. On the 22d the patient complained of dysuria, occurring suddenly after beginning to urinate, and accompanied by the passage of a few drops of blood and pain in the end of the penis; this continued more or less until the 30th. On October 2 he was employed in light duty about the ward, and was returned to duty on the 20th.

Case 13.—*Dizziness and drowsiness; intestinal symptoms slight; no rose-colored spots; defervescence about end of second week; convalescence on 24th day.*—Private W. T. Smith, Co. C, 1st Long Island Vols.; age 20; was admitted Sept. 14, 1861. Diagnosis—typhoid fever. Ten days before admission he had chills, followed by fever, increasing debility, pain in the head and bones, anorexia and slight diarrhœa. He rested well after a bath and Dover's powder, and on the 15th the pulse was 88, tongue moist, red at the tip and sides, brown in centre, bowels regular, skin dry and warm. In the evening he was drowsy and had a sense of heaviness over the eyes; the bowels were quiet. Sulphate of magnesia was given with the effect of moving the bowels twice. After this the bowels remained quiet, but with some tenderness and gurgling in the right iliac region. The tongue became somewhat dry on the 18th, but regained its moisture in a few hours. The skin became moist on the 20th, the appetite returned, and the sense of heaviness in the head was removed. On the 22d turpentine emulsion and one ounce of brandy were ordered for administration every three hours. He rested poorly on the 24th and had some nausea and less appetite. Castor oil was administered, and repeated on the 26th and on the 29th, after which one drachm of extract of senna was given daily for some days on account of headache and dizziness. He was able to sit up on the 27th, and was transferred to Annapolis, Md., on October 10th. No rose-colored spots were observed in the case.

Case 14.—*Headache; no diarrhœa; successive crops of eruption; convalescence following free perspirations on the 27th day.*—Corporal Joel E. Yaw, Co. H, 1st Long Island; age 19; had chills, fever and headache on Sept. 9, 1861, and was admitted on October 1st as a case of typhoid fever. On admission his pulse was 95, full and strong; skin slightly above the natural temperature and covered with elevated rose-colored spots on the chest and abdomen; tongue moist and heavily coated brown in the centre; appetite poor. Quinine was given on the 2d, tincture of iron on the 3d, and turpentine emulsion, three times daily, on the 4th. One stool was passed daily. On the 5th he was perspiring freely, and the chest and abdomen were covered with rose-spots and sudamina; on this and the following day he had a slight diarrhœal attack. After this he gradually improved and was transferred to Annapolis, Md.

Case 15.—*Mental dulness; delirium; eruption; diarrhœal affection not prominent as a symptom; skin moist; date of onset not defined.*—Private Frederick P. Seclor, Co. A, 9th Pa.; age 24; had suffered from fever and ague in June, 1861; but since then had done his duty uninterruptedly until September 19, when he was admitted as a case of typhoid fever. In the evening the patient was weak and had headache; the bowels were quiet, but there was some tenderness in the right iliac region and intestinal gurgling; face flushed; eyes bright; breath offensive; pulse 88; skin hot and moist; head cool and sweating; tongue grayish-yellow in the centre, red and clean at the edges. Ten grains of calomel and jalap were given. Next day, with a continuance of the symptoms stated, the patient became dull and stupid and had muscæ and tinnitus. On the night of the 21st there was delirium, and the characteristic eruption appeared on the 22d, on which day also he had two stools with some tympanites and tenderness; his tongue was black at the base, reddish-white in the centre and red at the tip. Turpentine emulsion and wine were given. Next night he was again delirious, and on the 23d dull, the skin unaltered save by the fading of the eruption from the chest and abdomen, the bowels quiet, slightly tympanitic but free from tenderness, and the tongue cleaning. Dover's powder was given in small doses, with stimulants. An enema was administered on the 24th, with two grains of blue-pill and one of quinine every three hours. By the 26th the eruption had disappeared, but the patient continued dull; the skin was moist, the tongue cleaning. The bowels were moved once on this day and on the 27th, and some tenderness and tympanites remained; but after this the tongue became clean, the appetite good and the bowels natural. The patient was returned to duty October 20.

Case 16.—*Date of onset not specified; delirium; rose-colored spots; diarrhœa persists after the occurrence of profuse perspirations.*—Private Harrison Woods, Co. K, 5th Wis.; age 26; was admitted October 1, 1861, with typhoid fever. He had been taken about September 1 with diarrhœa followed by fever. On the day after admission his face was flushed, eyes injected, pulse 100, skin hot, covered with perspiration, tongue moist, red, appetite not wholly lost; he had some headache but no diarrhœa nor cough. Tincture of iron was ordered three times daily. On the 3d rose-colored spots were noticed; the skin continued moist but the tongue was dry, red and glossy. Emulsion of turpentine was given. Next day sudamina appeared, and the patient was dull mentally, quite deaf and at times delirious. Rose-colored spots were very numerous on the 6th and 7th. The bowels were moved two or three times daily, and there was more or less of right iliac, umbilical and even general abdominal tenderness and meteorism. The tongue

became moist on the 10th, the face less flushed and the eyes clearer. The delirium disappeared on the 12th, but the deafness and tinnitus aurium, together with the diarrhœa causing three to five stools daily, continued up to the time of the patient's transfer to Annapolis on November 1st. A large crop of rose-colored spots appeared on the 20th and a few more on the 24th. [This patient was returned to duty November 9.]

Case 17.—*Deafness and aphonia the prominent symptoms; diarrhœa; rose-colored spots on the 6th day; improvement on the 21st.*—Private W. H. Harrington, Co. G, 22d Mass.; age 19; was taken sick March 1, 1862, with headache, nausea, debility, pains in the limbs and diarrhœa, and was admitted next day as a case of typhoid fever. No details are given until the 6th, when he was reported as weak, dull looking, very deaf and aphonic; he had epistaxis, cough, accompanied with epigastric pain, and rose-colored spots on the abdomen and chest. His skin was hot and dry; face congested; eyelids puffy; tongue moist and coated; stools frequent and watery. Quinine was given. The symptoms continued, being at times more or less aggravated, until the 21st, when the deafness was much diminished, the voice nearly recovered, the tongue cleaning and the bowels regular. A discharge issued from the left ear on the night of the 16th. On the 27th the general health was improving rapidly. On the 29th the patient was walking about. On April 15 he was discharged from the service on account of a contusion, the particulars of which do not appear on the record.

Case 18.—*Cerebral symptoms slight; diarrhœa abated after occurrence of perspirations; rose-colored spots on 13th and 15th days and on 17th and 22d, accompanied by sudamina and followed by convalescence.*—Private Joseph Husang, Co. E, 19th Iowa; age 19; had a chill followed by fever on August 27, 1861, and was admitted Sept. 4 as a case of typhoid fever. On the morning of the 5th he had slight fever and anorexia; pulse 84, skin dry, tongue coated brown in the middle and dry; the mind was clear. Quinine was given. In the evening there was moderate fever, the pulse 84 and strong, face flushed, skin dry and hot, tongue very red, flabby and coated white, appetite poor, bowels moved four times; the patient was weak and dizzy and had headache. Dover's powder was ordered. No marked change took place on the two following days; the face became flushed towards evening. On the 7th the skin was somewhat moist, and next day an eruption of rose-spots was observed. On this day, the 8th, he had six thin painless stools; he became restless, talking in his sleep, and in the evening drowsy. Pills of acetate of lead and opium were administered. On the 9th a slight cough was developed with mucous and sibilant râles; the abdomen became somewhat tender and the rose-spots disappeared. In the evening the pulse was 68; the tongue moist and heavily coated brown at the base; the skin warm and moist; the bowels were moved once during the day without pain, but some tenderness was present; anorexia continued and epistaxis was noted. Next day there was one painless stool; a few rose-spots appeared; and in the evening, while the skin was perspiring the tongue became dryer and there was some cough, flushing of the face and headache. Friction with alcohol was applied to the skin. The perspiration continued on the 11th, during which there was one stool at night and one during the day, and the patient became weak and exhausted. Aromatic sulphuric acid was ordered and the body sponged with alcohol and nitro-muriatic acid. On the 12th the skin became dry and a profuse characteristic eruption appeared. The lead and opium was omitted. Next day night-sweats were reported and some improvement in the appetite; but the tongue continued dry and brown. Blue-pill three times daily and oil of turpentine were ordered. On the 14th the tongue was cracked, and although there had been no night-sweats, the skin was warm and moist; the bowels were quiet and the appetite improved; in the evening there was a slight cough with diminution of the appetite. The night-sweats returned on the 16th, when also the tongue became moist and less coated, the bowels remaining quiet. Whiskey-punch was ordered. Next day the skin and tongue again become dry; rose-spots and sudamina appeared and the bowels were moved twice; a slight flushing of the face was noted in the evening, as also on the evening of the following day. On the 19th the tongue assumed a gray, moist coating; the skin was warm and sweating; the bowels moved once; rose-spots were present but no sudamina, no tenderness nor tympanites. From this time he gradually improved. Thus, on the 24th, the report is as follows: Rested well; pulse 98; tongue red, moist, slightly coated; bowels regular; appetite good. He was able to walk about on October 1 and was transferred to Annapolis, Md.

Case 19.—*Admitted delirious and in low condition about the 21st day; free perspirations occurred two days later, after which convalescence was gradually established.*—Private John Cross, Co. E, 14th N. Y. State militia; age 23, and of stout habit; had been sick three weeks when admitted Sept. 14, 1861, with typhoid fever. He was delirious and affected with great muscular debility and twitchings; pulse 120; skin hot and moist; face hot and dark-red; tongue coated brownish-white and fissured; body emitting a peculiar odor. Next day there was less delirium; but the subsultus continued with great roaring in the ears; the pulse was 104, tongue brown and slightly fissured, teeth covered with sordes, skin hot and dry, face flushed, on one side purplish-red, and abdomen tender on pressure. Turpentine emulsion and stimulants were ordered. In the evening the tongue was dry and coated posteriorly, and the delirium and subsultus persisted. Dover's powder was administered. On the 16th copious perspiration, with subsidence of the delirium and subsultus and increase of appetite was noted; the patient was weak and had great thirst, dryness of tongue and some incontinence of urine. In the evening the skin was warm and perspiring, the mind much clearer, the subsultus absent, the pulse 104, the tongue cleaner and moist and the bowels quiet. The Dover's powder was continued. He rested well, and on the 17th the tongue was white, pulse 100 and skin moist. Aromatic sulphuric acid was given. In the evening the pulse was 100, the tongue white and less fissured and the bowels regular. Next day sudamina appeared with free continued perspirations, great thirst for acid drinks, high-colored urine and regular bowels. After this the daily record varies but little, showing a good appetite, tongue moist, clean or with yellow or brown patches, the skin natural or moist, the bowels quiet except when sometimes moved after the administration of extract of senna, and the sleep sound. Some deafness and tinnitus were noted for a day or two. The patient was transferred to Annapolis, Md., October 1, where he was entered as a case of continued fever, and whence he was returned to duty October 21.

CASE 20.—*Record commencing about third week; perspirations accompanying subsidence of the fever.*—Private D. P. Smiley, Co. F, 11th Pa. Cav.; age 19; was said to have contracted diarrhœa on Sept. 9, 1861, and was admitted on the 30th. Diagnosis—typhoid fever. He was weak, had a slight cough, a diarrhœa yielding two stools daily and but little appetite; pulse 100 and quick; skin natural; tongue moist, but coated in the centre. Next day he was dull; had some headache and tenderness in the right iliac region. On October 2d the tongue was dry, brown and fissured in the centre. No change was noted on the 3d, but on the 4th his pupils were dilated; he was delirious and had a wild look. The delirium abated somewhat on the 6th; the tongue became dry, red and fissured by the 10th, but the appetite improved and the bowels continued unmoved for several days, the pulse beating 75 to 80 per minute, although there was some abdominal tenderness and tympanites, with flushed cheeks, injected eyes and nocturnal delirium. The patient perspired during the night, and next morning the tongue was red at the tip and edges and coated white in the centre; there was less delirium and the appetite was good. On the 12th the tongue was moist and clean but for a yellowish streak on each side of the centre. One stool was obtained on the 14th, after the administration of two compound cathartic pills. The tongue on the 17th was moist and clean but for some white patches. The patient steadily improved and was returned to duty November 13.

CASE 21.—*Headache; epistaxis; delirium; sordes and rose-colored spots on the 12th day; perspirations and convalescence on the 29th.*—Private Jno. Stoddard, Co. A, 13th N. Y. Vols.; age 25; was admitted Nov. 1, 1861, having been sick for a week before admission with headache, epistaxis, anorexia, thirst and cough. On the 2d the patient's eyes were suffused, face congested, pulse 100, full and strong, skin hot, tongue red at the tip and edges and coated yellowish in the centre; appetite poor; he had epistaxis during the day and one passage from the bowels, which gurgled and were tender on pressure, particularly on the right side; he had also some cough with yellowish blood-streaked sputa. The epistaxis did not recur, and next day he had headache, which was accompanied by mental hebetude on the 4th and by delirium on the 5th. An eight-grain dose of quinine, turpentine emulsion three times a day, and six grains of calomel with one of opium at night, were prescribed on the 4th. Rose-colored spots appeared on the chest at this time, as also dryness of the tongue and blackening of the teeth and lips from sordes. The delirium lasted only one day, but the dulness of mind persisted. A diarrhœa of three or four stools daily was perhaps due to the calomel, which was repeated on the 5th. Much abdominal tenderness and tympanites were also present; the appetite, however, continued good and the thirst was lessened. The tongue became moist and covered with white patches on the 6th, swollen and coated on the 7th and 8th and clean on the 10th; but the skin did not become moist until the 21st. On the 22d there was profuse perspiration. Complaint was made of earache on the 25th. Three days later the patient was able to leave his bed. On December 3, when transferred to Baltimore, Md., he had tinnitus aurium and cough and his bowels were slightly relaxed.

CASE 22.—*Date of onset unrecorded; cerebral, pulmonary and intestinal symptoms; rose-colored spots; convalescence.*—Farrier Alexander Wenrich, Co. K, 2d Pa. Cav. Admitted Nov. 5, 1861. Diagnosis—typhoid fever. On the day after admission he was delirious and slightly deaf; had frequent and involuntary stools, some cough and the respiration increased to 22; his eyes were injected; face congested; pulse 100, quick, bounding and intermittent; skin hot; tongue red and slightly coated yellowish-white. Hoffmann's anodyne, tincture of valerian, turpentine and astringents were prescribed, with morphia at night. Sordes appeared on the teeth on the 7th, on which day two stools were passed; beef-essence, punch and morphine were ordered. He was stupid on the 9th; had headache and tinnitus on the 10th, two stools and slight tympanites and tenderness in the right iliac region, but the tongue was moist and cleaning and the cough slight. Rose-spots appeared on the chest on the 11th. The delirium did not quiet down until the 16th, after which he slept well and had a good appetite. He was transferred to Alexandria, Va., Dec. 20th.

CASE 23.—*Deafness and mental dulness; intestinal symptoms; perspirations and rose-colored spots on 19th day; sordes and delirium on the 20th and 21st; convalescence on the 33d day.*—Private William O'Brien, Co. G, 13th N. Y.; age 20; contracted typhoid fever Oct. 15, 1861, and was admitted November 1. Next day there was headache and deafness, tinnitus and hebetude; the face was congested; pulse 78; the tongue was dry, swollen and coated yellow; the patient had no appetite, much thirst, relaxed bowels and some tympanites and abdominal tenderness; profuse sweating had occurred during the night, and on the chest and abdomen a few rose-colored spots were discovered. On the 3d sordes appeared on the teeth, and on the 4th delirium supervened, the patient making frequent attempts to leave his bed; the tongue became red at the tip and edges. There was less deafness, and the mind became clearer on the 6th, but the delirium did not entirely subside until the 11th. On the 16th the tongue was clean, pulse 75, and there was no abdominal tenderness. The case was treated from the 3d with milk-punch, beef-essence and emulsion of turpentine. He was transferred to Annapolis, Md., on the 18th [and returned to duty Dec. 16].

CASE 24.—*Presenting delirium, unconsciousness, floccitatio, subsultus, slight diarrhœa, rose-spots, sudamina, bed-sores and vibices. Improvement manifested about 35th day.*—Private William E. Thompson, Co. C, 9th Pa. Vols.; age 19; was taken about August 22, 1861, with pain in the head and back, epistaxis, chill, fever and diarrhœa, and was admitted September 12 as a case of typhoid fever: pulse 100, quick; skin hot and dry; tongue dry at the tip and coated gray at the base; the patient was dull-looking and had subsultus, relaxed bowels, right iliac tenderness and intestinal gurgling. Dover's powder was given. On the 13th the skin was hot but moist with perspiration; rose-colored spots appeared. Next day the skin was again hot and dry, but covered with profuse sudamina; the cheeks were flushed, the tongue dry, smooth, cracked and protruded with difficulty, and the patient stupid but restless. Toward evening on the 15th a few more rose-spots came out; sordes appeared on the teeth; the bowels continued slightly relaxed and there was right iliac tenderness; the patient was haggard; he turned his head from side to side, muttered, and had subsultus tendinum. No change occurred on the 16th, but on the 17th more rose-spots made their appearance and the patient became drowsy. On the 19th his pupils were dilated and he was unable to articulate. Next day the pulse was 112, irritable and full; the skin dry and husky; the rose-spots and sudamina had disappeared;

the tongue was rough, dry and brown: the gums and teeth covered with sordes: right iliac tenderness, meteorism, gurgling and relaxation of the bowels continued, and the patient muttered and groaned, but had no subsultus. He was greatly emaciated and prostrated, and for some days lay on his back with his eyes half-closed: sometimes partly delirious, picking at the bed-clothes, and at other times unconscious. Meanwhile the pulse became more rapid, rising to 128 on the 23d, and the circulation of the skin languid. He vomited on the evening of the 22d, and after this his bowels became more quiet. Bed-sores appeared over the sacrum. Turpentine, Dover's powder, astringents and stimulants had been used in the treatment. On the 25th the pulse was 114 and stronger, the tongue cleaning and the mind clearer, but the skin continued hot and dry, and vibices appeared profusely on the chest; the bowels remained quiet. The patient was sponged with alcohol and turpentine; warm bottles were applied to the feet and soft pads to the sacrum over the sores. In the evening the eyes became brighter and the skin moist, the pulse having meanwhile fallen to 100. Next day the patient was tranquil, the tongue moist and cleaning at the edges; the bowels were moved by an enema. A purulent discharge came from the right ear. The left ear became similarly affected on the 28th. The appetite returned on the 29th, and after this improvement continued. The patient was furloughed October 31.

Case 25.—*Delirium; involuntary stools; sordes; rose-colored spots; convalescence coincident with free perspiration.*—Private W. H. Barnett, Co. D, 14th N. Y.: age 26; was admitted Oct. 2, 1861, as a case of typhoid fever. On the 6th he was reported as weak and having suffused eyes, quick pulse, 115, hot and dry skin, moist, brown and slightly fissured tongue, anorexia, relaxed bowels and iliac tenderness. Turpentine emulsion and camphor with sweet spirit of nitre were ordered. Next day the patient was quite delirious and had three involuntary stools; sordes appeared on the teeth and six rose-colored spots on the skin. Milk-punch and tincture of opium were ordered. On the 8th the rose-colored spots increased in number and the delirium was somewhat lessened; the five stools passed were not involuntary; some irritability of stomach was manifested. Sudamina appeared on the 10th with a fresh crop of rose-colored spots, and the tongue became red at the tip and edges. On the 11th epistaxis occurred and the patient was stupid. Next day headache accompanied the delirium, the other symptoms continuing as already stated. On the 14th the tongue was somewhat moist and the appetite improved. On the 15th the pulse had fallen to 80, the diarrhœa lessened, epistaxis recurred and the patient was more rational. Next day there was only one passage from the bowels, but the right iliac tenderness continued with some tympanites and gurgling. Rose-colored spots appeared on the 18th and again on the 21st; on the former day the headache and delirium were greatly lessened, and on the 19th the tongue was clean and the appetite good; but some general tenderness continued in the abdomen and there was some cough. A free perspiration occurred during the following night, after which the progress of convalescence was steady. He was transferred to Annapolis, Md., November 1 [whence he was returned to duty on the 22d].

Case 26.—*Cerebral and intestinal symptoms; rose-colored spots from the 11th to the 34th day; improvement on the 26th day, coincident with subsidence of febrile heat and appearance of moisture on surface.*—Private Hugh Murphy, Co. I, 3d Vt.: age 22; had measles in July, 1861, and on Sept. 25 was taken with a heavy cold, chills, headache and diarrhœa. On admission, Oct. 3, his case was diagnosed one of typhoid fever. He slept well, but his eyes were suffused and he had some pain in the head, anorexia and slightly relaxed bowels; his tongue was moist and coated yellowish in the centre; skin natural; pulse 90 and full. Rose-colored spots appeared on the chest and abdomen on the 5th and were very profuse on the 7th, when the skin became hot and dry, the lips parched and the tongue red and glossy at the tip and edges and dry at the base and centre: five stools were passed on this day, and there was much tympanites but no tenderness. By the 10th the eyes had become injected, the cheeks flushed, the tongue dry and dark and the teeth covered with sordes; the patient was stupid and at times delirious; meteorism and borborygmus accompanied the diarrhœa. Up to this time emulsion of turpentine and Dover's powder had been used in the treatment; quinine was now given in two-grain doses every hour. The bowels were moved nine times on the 11th and the right iliac region was markedly tender. Tincture of iron was given on the 12th. Deafness was noticeable on the 13th. This condition of mental hebetude, deafness, occasional delirium, flushed face, hot and dry skin with eruption of rose-colored spots, dry and dark tongue and marked diarrhœa continued until the 20th, when the skin lost its heat, the tongue its dryness and the stools became less frequent; the patient was troubled with some cough during this period. The skin was reported moist for the first time on the 24th. The eruption did not disappear until the 28th. The tongue continued moist and but slightly coated, the skin natural, the appetite good and the bowels moved but once daily until Nov. 1, when the patient was transferred to Annapolis, Md. [whence he was returned to duty on Dec. 2].

Case 27.—*Diarrhœa; muttering delirium; coma vigil; sordes; dark-red spots, persisting under pressure, on the 17th day, after which improvement was progressive.*—Private Andrew Scriber, Co. C, 14th N. Y.; age 22: was admitted Sept. 20, 1861, having been taken sick two weeks before with chills, pains in the head and bones and great muscular debility. Diagnosis—typhoid fever. His pulse on admission was 118 and soft, face flushed dark-red, countenance anxious, skin hot and dry, tongue thickly coated gray in the centre, red at the tip and sides, gums and teeth covered with sordes; there was some diarrhœa with tenderness of the abdomen and tympanites; the patient lay with his eyes and mouth partly open, muttering incoherently when roused. On the 21st he was dull, stupid and difficult to arouse; pulse 90 and quick, skin hot and moist, tongue brownish-gray. He had six stools during the day, accompanied with gurgling but no tenderness. Turpentine emulsion and enemata of laudanum were ordered. On the 22d he was restless; pulse 112, small; skin hot and dry, with here and there dark-red spots which did not disappear on pressure; tongue brown and dry in middle, moist and red at edges. The diarrhœa was checked by the enemata, but there was some tenderness of the abdomen and intestinal gurgling. Brandy was given. On the 23d the eruption had disappeared; two stools were passed; the sordes persisted about the lips, but the tongue was cleaning from the edges. The sordes disappeared on the 25th. Next day the tongue was clean; there was some appetite, and the patient looked

and said he felt well: but he was restless and wanted to go out. He had three stools; pulse 84. In the evening the pulse rose to 100, the face was flushed, the skin hot and dry, and there was tenderness with slight fullness and one stool. On the morning of the 28th the pulse was 82; the skin warm and moist; the tongue moist, red at the tip and slightly coated. His appetite was good on the 29th. He had four stools on the 30th, but no tenderness; his countenance was natural, his skin warm and soft, and he was gaining strength. On October 20 he was detailed on extra duty.

Case 28.—*Dizziness; deafness; diarrhœa; eruption on the 9th day, not disappearing on pressure: manifest improvement coincident with epistaxis on 16th day; hemorrhage from bowels on 18th day, with subsequent inflammatory action in the genital, urinary and urinary organs, and delirium lasting until the 28th day, when improvement was again established.*—Private James Scofield, Co. K, 6th Wis.; age 20; became subject about Sept. 25, 1861, to dizziness and heaviness of eyes, chills, fever, diarrhœa, pain in the head and back and anorexia. He was admitted October 2 as a case of typhoid fever. His face was flushed darkly; eyes suffused; expression dull and heavy: pulse 100, strong and full: skin hot, dry, smooth and without eruption; tongue slightly moist, red at the tip and thickly coated grayish-white in the centre: bowels relaxed but not tender; he was somewhat deaf and had a slight cough. Next day the patient was drowsy and had headache with dizziness and increasing deafness; the skin hot and slightly moist, showed a few spots which did not disappear on pressure; the bowels were moved four times and were tender. No change took place until the 7th, when tinnitus aurium and epistaxis were noted, the tongue having become clean, dry, red and fissured. On the 9th the tongue became very rough, red and grayish-white in the centre: epistaxis recurred: four stools were passed, and there was slight tenderness in the right iliac region: the urine was scanty and very dark-colored. Next day epistaxis again occurred, the pulse was 100 and strong, the skin soft although hot and dry: the expression was less anxious, the eyes clearer, the hearing improved and the tongue moist and cleaning in the centre, but the patient complained of headache and pain in the back and side, a dry hacking cough and much thirst: he had two thin stools with much tenderness and gurgling and slight meteorism. On the 13th a profuse hemorrhage occurred from the bowels: the patient became very pale and stupid, pulse 120, skin hot and husky, tongue moist, pointed and slightly coated; the abdomen was soft and tender. Next day the pulse was 104, the skin dry and husky, the tongue dry, dark, cracked and rough, the countenance pinched and somewhat anxious, the teeth and gums covered with sordes: the bowels moved three times during the night, about eight ounces of blood coming away with one of the passages. No hemorrhage took place on the 15th, but the patient had subsultus tendinum and some bronchitic cough. His expression on the 16th was wild; he was very wakeful and complained much of pain in his heels and legs. On the 17th he perspired profusely and had frequent epistaxis but no stool: the bladder was so distended as to require the employment of the catheter; the tongue was dry, furred and scaly: pulse 112, feeble: mind dull: countenance anxious; respiration normal. Two stools were passed on the 18th; the bowels were tympanitic and acutely tender: the skin was dry but at times moist and perspiring: the delirium, present was partial in character. From this date until the 27th the patient was dull, drowsy and more or less delirious, sometimes crying out loudly: the skin was dry and husky but occasionally moist: the tongue dry, fissured and scaly and the teeth black with sordes: two or three stools were passed daily, and there was much right iliac and hypogastric tenderness, with meteorism and borborygmus; the catheter had to be used, and the urine withdrawn was strongly alkaline, containing blood, mucus, pus, epithelium and excess of phosphates. Some sibilant râles were heard in the upper parts of both lungs, and the respiration at one time became increased to 28 per minute. He was constricted and very weak: but on the 27th the mind became clearer. On the 28th the eyes were bright, the skin warm and perspiring, the tongue moist and cleaning, the bowels quiet, the abdominal tenderness much diminished, but still acute in the right iliac and hypogastric regions. On the 29th some appetite was manifested. The teeth and gums were clean on November 1. Micturition was free and natural on the 4th, but for some days after this he had at times much pain in the penis and bladder. On the 9th bed-sores are mentioned; the skin was hot and dry; the tongue dry, smooth and fissured: the bowels were quiet, but tenderness continued in both iliac regions; the appetite was good. No further record was made except that on the 20th the patient was transferred to Annapolis, Md. This case was treated with turpentine emulsion on October 7th, Dover's powder on the 9th, acetate of ammonia on the 10th, extract of buchu on the 11th, and thereafter with quinine, opium and stimulants.

Case 29.—*Deafness and headache; abdominal tenderness and tympanites, but no movement except by castor oil; rose-colored spots on the 12th to 21st day; defervescence by free perspirations on the 27th, and convalescence on the 33d day.*—Private F. Klussman, Co. I, 35th Pa. Vols.; age 23; was admitted Oct. 30, 1861. Diagnosis—typhoid fever. His illness began on Oct. 20, with chills and fever, anorexia and thirst. On the 31st he was very weak and did not sleep, the eyes dull, cheeks flushed, pulse 85, skin hot, chest and abdomen covered with a profuse rose-colored eruption, tongue red at the tip and edges but coated white in the centre, teeth covered with sordes: he was deaf and had tinnitus aurium, anorexia, thirst, extreme tenderness of the abdomen and tympanites although but one stool was passed: there was also some cough. Quinine and turpentine emulsion were prescribed. Next day the tongue became dry in the centre: on the 2d there was epistaxis, and on the 3d headache and inability to sleep, the tongue having meantime become dry, swollen and fissured at the edges. Beef-essence and milk-punch were prescribed, and as there had been no movement of the bowels for some days, castor oil was given; the abdomen was tympanitic and tender and gurgled under pressure. The tongue became moist on the 6th, the skin moist on the 7th, but free perspiration did not occur until the 16th, when the appetite returned. The headache became relieved about the 10th, at which time the last crop of the eruption faded. The patient was able to be up on the 25th, and was transferred to Baltimore on Dec. 3. Except on the day of admission, no passage was obtained from the bowels of this patient without the aid of cathartics.

Case 30.—*Delirium, diarrhœa and rose-colored spots; improvement dating from the 38th day, when the tongue became moist.*—Private Andrew Schick, Co. E, 1st Pa. Art., was taken about Aug. 20, 1861, with a cold; he suffered for a

week from diarrhœa with severe pain in the head, and fever which became aggravated in the middle of the day. He was admitted Sept. 19 as a case of typhoid fever. The patient was stupid, deaf and delirious; the stools thin; the right iliac region so tender that he objected to having the abdomen touched; the pulse 128, small and feeble; the skin hot but soft and presenting an occasional rose-colored spot with sudamina on the neck; the tongue red at the tip and gray in the centre and at the base. A half-ounce of castor oil was given. Next day three stools were passed, the skin was hot and dry, and there was much thirst; otherwise little change was presented. Quinine was given on the 27th. Next day there was less fever; the pulse fell to 95 and was stronger; the tongue was moist, but the skin continued dry; the mind became clearer. The improvement progressed on the 29th. The pulse on the 30th was 106; the tongue clean; appetite good; bowels quiet and natural. Whiskey-punch was given. The patient was returned to duty November 1.

Case 31.—*Date of onset unrecorded; rose-colored spots; delirium; chest complications interfere with defervescence about end of 4th week, and prolong the case for two or three weeks.*—Private Christian B. Krieger, Co. I, 4th Mich.; age 22; admitted Aug. 31, 1861. Diagnosis—typhoid fever. He was weak and feverish, and had diarrhœa, tympanites and well-marked rose-spots; pulse 110; tongue dry and brown but red at the tip; teeth covered with sordes. Brandy-punch, beef-essence and astringents were given. Next day he was slightly incoherent, and on September 4 delirious. The record does not again state his condition until the 13th, when there was fever with much thirst, delirium, tinnitus aurium, muscæ volitantes, a moist brown tongue and dry hot skin. Dover's powder, beef-essence and brandy were given at this time. On the 15th, the patient's general condition remaining the same, his pulse rose to 106, his tongue became dry, and in the evening his urine was passed involuntarily. On the 16th the presence of bronchitis was reported. Next day his tongue began to clean in patches, and on the 18th was moist, glossy and nearly smooth, the appetite improved and the bowels quiet; but the delirium did not abate until the following day, when in the evening it recurred, accompanied with abdominal tenderness and tympanites, some cough, hurried respiration, 30, and dryness of the tongue, which was protruded with difficulty. On the 21st he rested well; his face was pale and sunken but bright; his tongue remained dry, red and glossy, and was slightly coated in patches; the teeth were covered with sordes; the cough continued; but the hearing was good, the bowels quiet, the urine normal and the appetite good. Next day delirium was again added to these symptoms, and on the 23d some deafness and subsultus tendinum. On this day the tongue again became moist, but dried on the 24th in the centre although remaining red and moist at the edges. Turpentine emulsion was ordered. This condition continued until the 26th, when the delirium became lessened, the face and lips pale, the expression anxious, the eyes clear and bright, the pulse 96, the skin dry and husky but of natural temperature, and the tongue clean, soft and moist, but with some sordes remaining on the teeth. Some perspiration is mentioned on the 27th as occurring on the skin for the first time in the history of the case. Delirium recurred on the 29th, with slight failure of the appetite and cough, the tongue remaining moist and the bowels undisturbed. After this the skin was natural, moist, or occasionally dry, the tongue clean or slightly patched with yellow, the pulse from 72 to 96, the appetite good; but the bowels became relaxed, yielding two, three or four stools daily. While in this condition he was transferred to Annapolis, Md., October 10. [This man ultimately recovered and was returned to duty with his regiment.]

Case 32.—*Muttering delirium; sordes; intestinal effusion; rose-colored spots on 14th day; petechiæ on 15th; pains in the feet; slight improvement on the 17th, but record incomplete.*—Private C. D. Emons, Co. D, 7th Wis. Vols.; age 18; was admitted Oct. 30, 1861. Diagnosis—typhoid fever. He was taken sick about the 22d with diarrhœa, chills, weakness and loss of appetite. On admission his face was flushed, pulse 100 and of fair strength, skin hot and dry, tongue thickly coated, teeth black with sordes, breath very offensive; he had much thirst, relaxed bowels and some tenderness in the right iliac region, with borborygmus and tympanites; he muttered in his sleep. Oil of turpentine, compound catechu powders and whiskey-punch were prescribed. Delirium became a prominent symptom for a few days, during which the pulse was strong and slightly above 100, the face dusky, the eyes much injected and the tongue red at the tip, blackened and fissured; but on Nov. 4 the delirium lessened, the pulse fell to 86; he slept well during the previous night, the teeth and gums were cleaner and the skin was soft and presented a few rose-colored spots. On the 5th the pulse was 88 and feeble; petechial spots appeared on the skin; the tongue was very dry and thickly coated brown. The patient was drowsy and difficult to arouse; one stool was passed, and the bowels were tender and gurgled on pressure. On the 7th the mind became clearer and the eyes were less injected, but otherwise there was little change in the condition; he complained of pain in the feet. The record gives no further details. He was transferred to Baltimore, Md., on December 3.

Case 33.—*Muscular pains as a sequel of the fever.*—Private Benjamin F. Reynolds, Co. K, 86th N. Y.; age 29; admitted Feb. 18, 1862. Diagnosis—typhoid fever. On March 5 he was dejected and languid, complaining of rheumatic pains in the lower extremities; his skin was natural; pulse 90 and good; tongue moist and clean; bowels unmoved. Stiffness and pain in the legs increased until the 10th, the bowels meanwhile requiring aperients for their regulation. After this date he improved and was transferred to Annapolis, Md., on the 24th.

Case 34.—*Date of onset undefined; mental dulness; eruption; sordes; perspiration followed by delirium; improvement, but record unfinished.*—Private Henry Klummer, Co. I, 35th Pa. Vols.; age 20; was admitted Oct. 30, 1861, as a case of typhoid fever, presenting dulness of mind, dull and somewhat injected eyes, congestion of the face, a full strong pulse beating 90 per minute, a hot skin showing a few rose-spots on the chest and abdomen, a dry, fissured and brown-crusted tongue, sordes on the lips and teeth, anorexia, thirst and some tympanites. Beef-essence, quinine and turpentine emulsion were prescribed. No change took place until November 2, when the skin was bathed in perspiration and some deafness was noted. Delirium set in on the 3d, on which day the patient had three stools. The tongue seemed cleaning on the 7th and the delirium lessened, but the condition otherwise was as related. On the 9th, after passing a better night than usual, he showed a return of appetite. Next day he was intelligent. On

the 11th the tongue was red at the tip and edges, dry and brown in the centre and the skin was hot, but the patient slept well, had a good appetite, and his bowels were quiet. The record gives no further details. He was transferred to Baltimore, Md., on December 3.

CASE 35.—*Giving a view of the patient for ten days during convalescence from a protracted attack of fever.*—Private Alfred G. Bates, Co. A, 3d Mich.; age 24; became affected with typhoid fever in June, 1861, and was admitted Sept. 28. He felt pretty well, but he had some cough with expectoration, and pain in the head, back and limbs; his face was slightly flushed and his eyes dull; pulse 96, full and strong; skin hot and soft; tongue white in centre; appetite small; bowels quiet but somewhat tender and tympanitic. He slept poorly the first night, but very well after that. His tongue was more or less coated white or yellowish in the centre and red at the tip and edges; his appetite improved. His bowels were not relaxed; small doses of blue-pill and compound extract of colocynth, castor oil and sulphate of magnesia had to be prescribed to move them. At one time he had some difficulty in micturition. When transferred to Annapolis, Md., on October 10, his skin was of the normal temperature, tongue moist and clean, appetite good and bowels quiet.

CASE 36.—*Delirium; diarrhœa; rose-spots, vibices and bed-sores; pneumonic complications delay convalescence until after the 40th day.*—Private George Felter, Co. B, 9th Pa. Vols.; age 22; was taken sick about Sept. 1, 1861, and admitted on the 19th with typhoid fever. The notes of the case on the 20th are: pulse 96; skin hot and dry; high fever; tongue coated white in centre, red at tip and edges, slightly moist; acute iliac tenderness; tympanites; constipation; enlargement of the thyroid gland. Ordered: enema of soapsuds; emulsion of turpentine; Dover's powder at night. On the 21st: pulse 120, full and soft; skin hot and moist; tongue dark-red at the margins, dry and brown in the centre; characteristic rose-spots; no sudamina; less tympanites; tenderness of abdomen on pressure; borborygmus; subsultus; delirium; drowsiness; decubitus dorsal; respiration 30. Gave wine whey four times daily with beef-essence. On the 22d, morning: delirium; subsultus; pulse 118, full and soft; few rose-spots; skin hot and dry; tongue very red and moist; respirations hurried; submucous and sibilant râles in upper part of both lungs; decubitus dorsal; acute general abdominal tenderness; tympanites less; borborygmus; one stool. Ordered: one-fourth of a grain of morphia; cold applications to head. Evening: pulse 120; face flushed; skin hot and dry; tongue dry; rose-spots; high fever; delirium; deafness. No change took place until the 24th, when there was some diarrhœa. On the 25th the tongue became slightly moist and cleaner, the delirium gave place to dulness, vibices appeared on the chest, the urine and fæces were passed involuntarily and a large bed-sore formed over the sacrum. The tongue became again dry on the 26th, and the lungs were found consolidated in their lower portions. On the 27th the pulse was 113 and strong, the face flushed, the skin hot and dry, the respirations 40, with submucous and sibilant râles in the upper part of the right lung and a short dry cough. A blister was applied to the upper part of the chest. The bowels were quiet on the 28th. The tongue became moist on the 29th, red at the tip and gray in the centre; the skin was warm, dry and soft; the bowels were quiet, but there was tenderness on both sides, with tympanites and borborygmus; the sacral sore was healing and the patient rational. The chest was again blistered; tonics and stimulants were administered. The stools became involuntary on the 30th, with acute right iliac tenderness and some anxiety of expression; pulse 106; surface circulation sluggish; respirations 40; some cough and much dyspnœa. The patient became restless on October 1. Vibices appeared on the abdomen on the 2d; some diarrhœa occurred, the stools being involuntary; delirium occasionally returned at night. On the 4th there was some improvement in the chest-symptoms. On the 7th the face was slightly flushed; the pulse 114, steady; the skin hot and dry, moist in some places; the tongue moist, red at tip, coated in centre; the bed-sores showing points of granulation; the stools involuntary at long intervals, with borborygmus and some tympanites but no tenderness; micturition involuntary. On the 8th, 9th and 10th the pulse fell respectively to 108, 106 and 100, one or two stools occurring daily with some tenderness—the skin continuing hot and dry, but the tongue becoming cleaner and its edges moist. On the 10th the eyes were bright and the countenance cheerful. The pulse fell to 90 on the 11th; the condition of the tongue improved and the appetite returned. On the 17th the tongue was clean and moist but redder than natural; the bowels were regular; the appetite good; a slight cough yet remained. The record, which is continued in detail up to the 27th, shows the occurrence of an occasional thin stool but the tongue preserved its clean and red condition, the appetite was good and the sleep sound at night; no further reference is made to the healing of the bed-sores. This patient was transferred to hospital at Alexandria, Va., December 20.

CASE 37.—*Skin generally moist and intestinal symptoms not prominent; some delirium and pulmonary trouble; crops of rose-colored spots from 13th to 31st day; convalescence on the 37th day.*—Private Martin A. Stowell, Co. A, 3d Vt.; age 24; was admitted Oct. 1, 1861, having been sick since September 24 with pain in the head, back and limbs, and diarrhœa. Quinine had been taken. On the day after admission he was looking natural although his face was somewhat congested; pulse 100, full and strong; skin hot and moist; tongue moist, white at the edges, dry and brown in the centre; he had some headache and abdominal tenderness. Spirit of nitre, camphor and tincture of iron were ordered. A six-grain dose of blue-pill was given on the following day, and repeated on the 4th, with two grains of extract of colocynth. On this day there was some delirium; the tongue was moist and yellow coated and the skin covered with perspiration. This was followed by frequent stools on the 5th, but the diarrhœa did not persist. During the remainder of the patient's sickness the bowels were moved twice daily for two weeks and once daily thereafter to the termination of the record. Rose-spots appeared on the chest on the 6th, the tongue became red at the margins and brown-coated in the centre, and there was slight tenderness in the right iliac region. More rose-spots erupted on the 8th; the tongue became dry, red and cracked, and there was tenderness in the left iliac and umbilical regions with borborygmus. On the 11th a few rose-spots appeared. On this day turpentine emulsion was prescribed. Delirium returned on the 13th and continued at times until the 18th, during which time the tongue, skin and pulse were unaltered, although a slight cough was developed. But on the 18th the tongue became slightly moist, and next day it was

moist and clean, the pulse 72, regular, the skin of natural temperature although still showing some rose-colored spots, the appetite good, the abdomen tender and tympanitic over the transverse colon. Some rose-spots appeared on the 24th. On the 30th the patient was dressed and sitting up. On November 1 he was transferred to Annapolis, Md. [whence he was discharged on the 29th because of debility].

Case 38.—*Delirium and rose-colored spots on the 9th and following days; intestinal symptoms not severe. A favorable change on the 16th day is interrupted by the occurrence of pneumonia; improvement on the 32d day.*—Private Hiram Billington, Co. F, 2d Me.; age 29; admitted Oct. 7, 1861. Diagnosis—typhoid fever. He was taken with headache on Oct. 1 and with pain in the back on the 3d, but had no chill, diarrhœa nor eruption. On the evening of the 7th he was somewhat dull, his face flushed dark-red, pupils dilated, head hot and painful in the temporal regions where the arteries throbbed strongly; tongue red at the tip and coated in the middle; skin hot and moist; he had pain in the back, slight cough, abdominal tenderness and slight relaxation of the bowels; pulse 100. Cold water was applied to the head and five grains each of calomel and jalap given at once. Next day he had two thin stools, his tongue was cleaning and his pulse lowered to 90, but to the headache, flushed face and other symptoms of the previous day some deafness was added. Quinine was ordered. The dilatation of the pupils continued on the 9th with increasing dimness of vision and muscæ volitantes; the patient muttered in his sleep, and even when awake his mind was at times disturbed; he had a dry cough and pain in the chest, but his respiration was not accelerated; his bowels were moved twice, and he had acute tenderness in both iliac regions but no borborygmus nor tympanites; his skin was hot and moist and showed a few rose-colored spots on the chest and abdomen; his tongue was quite red, moist and clean, and he had anorexia and great thirst; pulse 88; urine chemically and microscopically normal. He was very drowsy on the 10th and had violent delirium in the afternoon. Next day a few more rose-spots came out, the skin became warm and dry and the tongue very dry, hard and fissured; two thin stools were passed with gurgling but no tympanites. On the 12th the red spots had become darker in color; there was less delirium, but the eyes were somewhat suffused and the expression stupid. Turpentine emulsion and spirit of Mindererus and of nitre were given. On the 13th the mind was clear and the countenance natural, but there was some dizziness at times; pulse 80, steady; skin soft and warm; tongue dry in the centre, moist at the edges, quite pale and slightly coated; the anorexia continued, but the thirst was lessened; three stools were passed. The bowels were moved but once on the 14th and were quiet on the 15th, on which day a few more rose-spots appeared. During the night he slept well, and on the 16th the skin was moist and warm; the tongue cleaning from tip and edges but still coated in the centre; the bowels continued quiet. Citrate of iron and quinine was given. During the ten days which followed there was but little change in the patient's condition; the bowels were quiet or moved once daily, with more or less of tenderness; the skin was warm and moist in the day-time and frequently bathed in perspiration at night, and the tongue was moist; but on the 25th, after a sleepless night, the tongue became dry and fissured, and complaint was made of cough and pain in the præcordia, near which submucous and sibilant râles were heard. A blister was applied, and on the 27th one drachm of Epsom salt and a half grain of tartar emetic were given three times daily. Next day there was mucous expectoration with dulness over the lower part of the left lung, and the patient became delirious. Brandy-punch was substituted for the tartar emetic mixture. On the 29th the patient was very drowsy, moaned frequently and muttered in his delirium; his tongue was coated with scales, dry in the centre, pale and moist at the edges; the teeth and gums were thickly covered with sordes; the skin was hot and moist; pulse 96; respiration 33, short, quick and somewhat labored; râles were heard in the lower parts of the lungs, and to a less extent in the upper parts; the expectoration was rust-colored; the bowels were moved twice and were tender and tympanitic. Calomel and opium in repeated doses were ordered on the 30th. On the 31st there was much cough with rusty sputa. A slight improvement was manifested on November 1. He slept well during the following night, and on the morning of the 2d looked bright although very weak; some thirst continued, but there was a slight appetite, and the teeth, gums and lips were clean; the tongue was moist, deeply fissured and covered with white patches; the urine contained a trace of albumen. Slight salivation occurred on the 4th, on which day the urine was found to be normal. The last entry with regard to the case, dated on the 7th, shows the patient as having rested well during the preceding night and as being bright and cheerful at the morning visit, the pulse 88 and of good strength, the skin soft and warm, the tongue soft, moist, fissured and coated; some cough continued and the bowels were moved twice, but there was no tenderness. He was transferred to hospital at Alexandria, Va., on December 20.

Case 39.—*Pneumonia occurring after the appearance of profuse perspiration and rose-spots.*—Private Warren G. Butler, Co. I, 2d Me.; age 22; was admitted March 2, 1862. Diagnosis—pneumonia. This man had measles with severe sore throat in September, 1861. On the 4th he had headache and deafness; his cheeks were flushed and hot; pulse weak and rapid; skin hot and moist, showing on the abdomen some eruption, which disappeared on pressure; tongue dry and coated; two watery stools were passed; cough was troublesome, the respiration natural. Next day there was profuse perspiration and great thirst, the tongue remaining dry and coated; the bowels were constipated and the patient suffered from tormina and frequent nausea, tinnitus aurium and dizziness; the breathing became rapid and the cough aggravated. Ten grains of calomel were given with three of jalap. On the following day there was much tendency to stupor; four watery stools were passed during the night, after which the bowels became quiet. Little change occurred during the next two or three days. On the 10th profuse perspiration occurred; the expectorated matters were exceedingly viscid. Milk-punch, cod-liver oil and carbonate of ammonia were given. On the 11th the skin was natural, the pulse rapid and weak, the tongue moist, clean and tremulous, but the appetite remained poor; three watery stools were passed and the cough continued. During the next two days the quantity of the sputa diminished. On the 13th there was occasional nausea, and on the 14th the deafness was increased, although otherwise the patient seemed better, as the bowels were regular, the skin natural, the cough lessened and the sputa less viscid and more frothy. The deafness increased until the 19th, after which it lessened; the cough

prevented sleep at night and the appetite did not return: the tongue was clean but unnaturally red in color. On the 25th, the last day on which the symptoms were entered, the appetite was improving. The patient was furloughed on April 8.

CASE 40.—*Pneumonia precedes the febrile attack, which is not characterized by severe symptoms.*—Private Elijah Marsh, Co. D, 7th Wis. Vols., was admitted Oct. 30, 1861. Diagnosis—typhoid fever. On October 9 he had pain in the bowels but no diarrhœa, pain in the chest and cough with rusty sputa. On the 27th he had a chill followed by some fever, but without headache or confusion of mind, epistaxis or diarrhœa. On admission the skin was husky, tongue dry and smooth, teeth blackened, pulse 80; there was difficulty of swallowing from soreness of the fauces; he had two thin yellowish stools with acute tenderness in the right iliac region, but no tympanites nor gurgling; he had little appetite and was very weak; some cough was also present. Turpentine emulsion and whiskey-punch were prescribed. Next day he had soreness in the bones, occasional dizziness and mental dulness. On November 1 the tongue became moist, clean at the tip and edges but covered with a grayish fur at the base; on this day he expectorated some blood. There was some headache on the 2d; but the patient slept well on the 3d, and next day there was moisture and sudamina on the skin, while the tongue had again become dry and brown and there was much abdominal tenderness; two stools were obtained on this day by means of castor oil. The tongue on the 6th became again moist and clean at the tip and edges and the skin dry; two offensive stools were passed; there was some cough and the respirations at this time were increased to 34 per minute; two rose-colored spots were discovered on the chest. The record gives no further details, closing with the statement that the patient was returned to duty on December 1.

CASE 41.—*Increasing drowsiness; deafness; delirium; relaxed bowels; no eruption. Killed on the 12th day by springing from a window to the ground.*—Private Henry Hickman, Co. B, 83d Pa. Vols.; age 20; was admitted March 2, 1862. Diagnosis—typhoid fever. He became sick on February 23 with headache, chilliness, cough and pains in the limbs, for which Epsom salt was given. On admission he had much pain in the right side; he slept fairly at night, but was drowsy during the day; he had much thirst, slightly flushed cheeks, dejected countenance, full and rapid pulse, hot and dry skin, a moist tongue coated in the centre and one thin scanty stool; his respiration was hurried. A blister was applied over the right lung; three-fifths of a grain of calomel and one-tenth of a grain of opium were given every hour. The drowsiness increased on the 5th and there was some deafness. Twenty-four grains of quinine were directed to be taken during the day. He became delirious on the 6th, and at night rose from bed, sprang from a window and was killed by the fall.

CASE 42.—*Deafness; delirium; diarrhœa; cough; eruption; death on 20th day from pulmonary congestion.*—Private C. A. Bartlette, Co. H, 5th Vt. Vols.; age 23; was admitted Nov. 1, 1861. Diagnosis—typhoid fever. His illness began about October 15 with pain in the back and limbs, anorexia and diarrhœa. On November 2 he was wakeful, his eyes dull, face congested, pulse 100, skin hot and dry, showing the characteristic eruption, tongue dry, red at the tip and edges and coated yellow in the centre; he was very deaf and had buzzing in the ears, much right iliac tenderness and some cough with yellowish sputa. Next day he was stupid and delirious, frequently attempting to leave his bed; his pulse was imperceptible and his breathing laborious. He died on this day. Turpentine, milk-punch and beef-essence were prescribed, with sinapisms to the abdomen.

CASE 43.—*Delirium; diarrhœa; iliac tenderness; no rose-colored spots; coma; death on 29th day.*—Private William Etzel, Co. C, 2d Pa. Cav.; age 29; was admitted Nov. 5, 1861. Diagnosis—typhoid fever. He had been in good health until October 22, when he was seized with chills followed by fever, epistaxis, pains in the back and limbs, lassitude, anorexia and thirst. On the 6th his countenance was anxious, eyes dull and suffused, face congested, pulse 95, skin hot, tongue slightly moist, red at the tip and edges, coated white in the centre, appetite good, thirst considerable; he was somewhat deaf and spoke in a whisper; one stool was passed during the previous twenty-four hours, and there was much iliac tenderness with some tympanites; the respirations were 20 per minute and there was some cough. One drachm of emulsion of turpentine was prescribed, to be taken every four hours. On the 8th the tongue was dry and yellow in the centre and the teeth covered with sordes; he slept well and had a good appetite. He became dull and stupid on the 10th and had three stools with much tenderness and tympanites, but no cough. On the 16th he was delirious and constantly picking at the bed-clothes. The diarrhœa continued, the tongue being moist and yellow-coated, pulse 90, skin hot; coma supervened, followed by death on the 19th.

CASE 44.—*Lack of sweat not defined; diarrhœa; headache; wakefulness; mental dulness; eruption; cough; inflammation of parotid; death 13 days after admission.*—Private John Kuenzle, Co. I, 35th Pa. Vols.; age 29; was admitted Nov. 5, 1861. Diagnosis—typhoid fever. He had been attacked some time before with chills followed by fever, headache, anorexia, thirst and diarrhœa. On the 6th he was wakeful, eyes suffused, cheeks slightly injected, pulse 100, skin hot and showing a few rose-spots on the chest, tongue dry and coated brown in the centre, teeth black with sordes; his appetite was poor and he had slight headache and tenderness in the parotid region; the bowels were relaxed and the abdomen tympanitic. Emulsion of turpentine was given every four hours; twelve grains of quinine and astringents were ordered, with Dover's powder at night. Next day the tongue was red at the tip and edges, brown in the centre and slightly moist; the quinine was repeated. He continued in this condition and under treatment by quinine until the 10th, when some cough was recorded. Next day he was dull mentally, and the cough was accompanied with white frothy sputa. No further details are given. He died on the 17th.

CASE 45.—*Diarrhœa; cough; sordes; rose-spots on 8th day, succeeded by others on the 11th, 14th and 17th days; deafness; delirium; epistaxis; otorrhœa on 22d day, with relief to all symptoms; death from pneumonia on the 31st day.*—Private Z. McLaughlin, Co. A, 3d Pa. Cav.; age 18; was admitted Oct. 20, 1861. Diagnosis—typhoid fever. He had been healthy until Oct. 14, when he was seized with chills followed by fever and sweating. On admission he had epistaxis, diarrhœa, anorexia, thirst and cough. Next day his eyes were dull and slightly injected; pulse 94 and

quick; skin hot and dry, presenting a profusion of colored spots on the chest and some on the abdomen; tongue slightly moist, red at the tip and edges but coated white in the centre; lips black with sordes; two stools were passed during the twenty-four hours; there was some meteorism and also a slight cough. Tincture of iron was prescribed. Next day eight stools were passed, and there was some cough with expectoration of tenacious mucus. Turpentine emulsion, lead, tannin and opium were prescribed. The diarrhœa, which was attended with much tympanites, became checked in the course of a few days and the bowels thereafter remained quiet or with not more than one movement daily; the skin continued hot and dry throughout. Fresh crops of rose-colored spots appeared on the 24th, 26th and 30th, and were reported on November 2 as fading and unelevated; but on the 3d and 5th the chest is noted as covered with sudamina. Deafness was recorded on October 24; buzzing in the ears on the 27th; epistaxis and delirium on the 29th, the former recurring on the 31st and on November 3 and 4. On October 30 the patient was kept from sleeping by the cough, and there was much delirium, deafness and tinnitus; at this time the tongue was dry and its papillæ prominent. On November 1 the tongue was swollen, dry and brown. On the 3d the deafness was very great, but a discharge occurred from the ear, and with this the tongue became moist and the deafness lessened. On the 4th, when the last attack of epistaxis occurred, the pulse became so faint that it could scarcely be counted; but the appetite improved. On the 5th the tongue was moist and yellowish, pulse 100 and feeble; there was no abdominal tenderness and less cough. On the 8th the pulse was 105 and the respiration 22. Next day the pulse was 120. Death took place on the 12th with pneumonic symptoms.

Case 46.—*Diarrhœa; drowsiness and deafness; bronchial and pneumonic accompaniments; rose-colored spots on 17th and vibices on 25th day; otorrhœa; pains in the legs; death on the 122d day.*—Private Mark Warner, Co. E, 1st Pa. Art.; age 26; was taken sick Sept. 1, 1861, with pain in the back and bones, headache and chills, and was admitted on the 16th. Diagnosis—typhoid fever. On admission his pulse was 94; tongue smooth and dry in the middle, moist at the edges; skin hot and moist; cheeks flushed; eyes dusky; bowels loose and tender; he had headache and was dull mentally. Catechu was used. Next day the characteristic rose-colored spots appeared on the chest and abdomen and sibilant and sonorous râles were heard over the chest, especially on the left side. Whiskey-punch and turpentine emulsion were prescribed. On the 18th the patient was drowsy and had acute tenderness in the abdomen and tympanites, although the bowels were quiet. An enema of soap-suds was administered. On the 19th the skin was moist and the mind less obtuse, the bowels loose, the tympanites reduced, but the tenderness was not lessened. The respirations were increased to 30 on the 20th; bronchitic sounds were heard over the whole of the chest, and a part of the lower lobe of the right lung was consolidated. Dover's powder was given. On the 21st the pulse was 108, soft and weak; skin hot and dry, showing a few fresh rose-colored spots; decubitus dorsal with flexed limbs; tongue smooth, glossy, dry; bowels relaxed, tender and tympanitic in the iliac regions; the patient was somewhat deaf, and complained of pains in the limbs. Vibices appeared on the skin on the 25th and 29th, sudamina on the 27th. The tongue became clean on the 26th and the appetite returned on the 30th, the chest symptoms meanwhile gradually becoming relieved; the pulse, however, continued accelerated, 100 to 112. On October 7 a discharge from the ear was treated with a solution of nitrate of silver; but it became more profuse and persisted up to the close of the detailed record. On the 9th the patient suffered much from pain in the legs, which were greatly emaciated; sponging with alcohol gave temporary relief; this pain also continued to the close of the record on October 17. After this date the only entry made was the announcement of death from typhoid fever on December 31.

Case 47.—*Severe diarrhœa at the onset; delirium and great prostration; improvement on the 12th day coincident with eruption and epistaxis; recurrence of severe symptoms on the 33d day, and death on the 36th.*—Private F. Taylor, Co. I, 2d Mich. Vols.; age 23; was admitted Aug. 16, 1861, with rheumatism. He improved rapidly till Sept. 6, when he was seized with a severe diarrhœa, fever and pains in the head and bones. Sugar of lead, tannin and opium were prescribed. On the 11th tinnitus aurium, muscæ volitantes, slight deafness and headache were among the symptoms; the skin was hot and dry, pulse 116 and weak, tongue coated; seven stools were passed. On the 12th emulsion of turpentine was prescribed. On the 13th the tongue was dry and brown and the patient muttered in his sleep. He complained much of rheumatic pains in his bones; his bowels were moved five times during the night and nine times during the day. Beef-essence and brandy were given. He perspired much on the 15th, and the urine passed involuntarily. On the 16th he was very weak and had a cadaverous look; his tongue was dry, brown, glossy and red at the tip; the diarrhœa continued. On the 17th he was much prostrated, somnolent and indifferent to surrounding objects, but the bladder was more under control and the stools less frequent. He had epistaxis during the night, and next day the tongue became moist and clean in patches and some rose-colored spots appeared on the abdomen. He was brighter on the 19th, free from delirium, but with some headache, dizziness and deafness; the tongue was clean, dry, glossy and protruded with difficulty. On the 20th the eyes were bright, face pale and sunken, pulse 90 and weak, skin warm and moist, tongue dry and brown but red at the tip and sides, teeth and lips clean; he had some appetite; one stool was passed and the iliac regions were tender. He continued in this condition, the bowels comparatively quiet,—occasional headache, dizziness and slight deafness being the only cerebral symptoms until October 8, when diarrhœa again set in with delirium, dulness, deafness, great prostration and profuse sweating, ending in death on the 11th. A copious eruption of rose-spots appeared on September 24, vibices on the 28th, with fresh and numerous outcrops of the latter on October 4 and 8.

Case 48.—*Probable relapse four months after primary attack. Diarrhœa; abdominal tenderness; eruptions; sordes; delirium; death.*—Private William Boardman, Co. D, 1st Pa. Rifles; age 29; was admitted Oct. 10, 1861. He stated that he had been sick since June, when he had an attack of enteric fever. On admission he had headache and was anxious looking, his eyes dull, cheeks flushed, pulse 90, quick and feeble, skin hot and dry, tongue slightly moist, red at the tip and edges, black and fissured in the centre; his appetite was fair. Dover's powder was prescribed. Next day he was reported as having had four movements of the bowels; his tongue had become white in the centre

and his skin covered profusely with an eruption the character of which is not stated. Punch and tincture of iron were given. The eruption is mentioned on the following day and again on the 21st. During the progress of the case the bowels were relaxed, two stools being passed daily. The appetite continued good until the day of death. There was great tenderness in the abdomen, which was at first especially marked in the left iliac region, but afterwards became associated with various regions as the epigastric, umbilical, the track of the transverse and descending colon and on one occasion the right side; the tenderness was usually accompanied by meteorism and gurgling. The skin was hot and dry throughout except on one or two days, when it was reported as very dry but not hot. The tongue was dry, red, fissured and glazed, the lips covered with sordes and the teeth with tenacious mucus. On the 16th there was some headache with occasional delirium of a mild character, which afterwards became more continuous. On the 23d the patient is reported as having slept well as usual; his countenance was pale, face pinched, lips parched, skin and tongue dry, pulse 95 and feeble, the abdomen flat. Turpentine emulsion, cod-liver oil and quinine were prescribed. He died during the night.

Case 49.—*Relapse. Head symptoms not marked; rose-spots from the 41st to the 59th day; vibices on 50th; bowel affection not prominent until cessation of perspirations; returned to duty in 160 days.*—Private M. R. Taggart, Co. A, 9th Pa. Vols.; age 34; was admitted Oct. 10, 1861, having been sick since Sept. 1 with what had been regarded as enteric fever, for which quinine had been given. On admission his eyes were dull, face congested, pulse 110, quick and full, skin hot and dry, tongue moist, red at tip and edges, coated white in the centre, appetite poor; he had some cough. Dover's powder was given. He slept badly during the night and next day was stupid and dull-eyed; a few rose-colored spots were found on the chest and many on the abdomen; the pulse was 100 and feeble; his bowels had not been moved. Tincture of iron was ordered to be taken three times daily and extract of senna in the evening. He slept well, and on the morning of the 12th the pulse was found to have fallen to 90; the eyes were bright and the flush had disappeared from the face; the bowels had not been moved, but there was much tenderness in the right iliac region. On the 13th the patient was covered with a profuse perspiration; pulse 120 and feeble; a slight epistaxis had occurred and one stool had been obtained. Tincture of digitalis and sweet spirit of nitre were ordered to be taken four times during the day. The perspiration continued on the 14th, and the appetite was found to be improved. Five grains of quinine were given every two hours. On the 15th the pulse had fallen to 90 and was more regular, the skin was hot but somewhat moist, the tongue dry, the appetite poor; the bowels had been moved twice. On the morning of the 16th the skin was dry, but there had been a profuse perspiration during the night; the tongue was red and clean but dry, and the appetite poor; one stool was passed, and the patient was troubled with cough. Profuse perspiration recurred nightly until the 22d. On the 17th the tongue became moist and covered with white patches. Next day a few rose-spots appeared on the abdomen; two stools were passed, and there was slight umbilical tenderness. On the 19th the profuse perspiration continued during the day; the pulse rose to 120; tympanites and borborygmus were present but no stool was passed. Several rose-spots and vibices appeared on the abdomen on the 20th; pulse 86; two stools were passed. The skin was soft and natural on the 21st, and next day the tongue was clean and moist and the appetite good. During the following week an occasional nocturnal perspiration was noted, but otherwise the condition of the patient was good. On the 29th some rose-spots appeared and three stools were passed. Four stools were recorded on the following day, and on the 31st nine stools, with dry tongue, heat of skin and accelerated pulse. Twelve stools were passed on November 1, on which day the patient was transferred to Annapolis, Md. [where his case was diagnosed typhoid fever, and terminated in a return to duty on March 19, 1862].

Case 50.—*Diarrhœa; rose-rash; delirium; parotid inflammation; coma vigil; return of consciousness before death at end of third week.*—See case of Private Oscar Snow, Co. H, 3d Vt., No. 31 of the *post-mortem* records.

Case 51.—*Chills; epistaxis; diarrhœa; tympanites; vibices; deafness, but no delirium or notable cerebral implication; temporary improvement followed by bed-sores, and death probably from pulmonary engorgement.*—See case of Private Benjamin Cunningham, Co. D, 86th N. Y., No. 34 of the *post-mortem* records.

Seven Remittent Cases.

Case 52.—Private James Brown, Co. B, 26th Pa. Vols.; age 38; was attacked Aug. 20, 1861, with headache, chill and pains in the bones, and admitted Sept. 4 as a case of remittent fever, presenting constipation, anorexia and epistaxis, with high fever, the pulse being 100, the skin moist and the tongue heavily coated and of a yellowish-brown color. A dose of Epsom salt was taken at once, and quinine ordered three times daily. The bowels were moved twice during the night and once next morning, after which the pulse was found lowered to 60, the skin natural, the tongue pale, flabby and coated, and the abdomen sore. Dover's powder was given at night. The fever did not recur. The tongue continued pale, flabby and somewhat coated, but the appetite returned, and he was sent to duty on the 11th.

Case 53.—Private James Baker, Co. D, 19th Ia. Vols., was admitted Sept. 4, 1861, having had a chill followed by fever without diarrhœa. Diagnosis—remittent fever. On the morning of the 5th his pulse was 70; skin moist and cool; tongue pale, flabby and slightly coated, and bowels loose from the action of Epsom salt; he had a dry cough with pain in the chest. Quinine was given. In the evening there was some heat of skin, but otherwise the condition of the patient was unchanged. The cough was somewhat troublesome on the 6th, but there was no fever. The tongue continued pale, flabby and more or less coated, but the appetite returned and on the 9th he was able to walk about. His bowels did not remain loose after the purgative action of the salt had ceased. No eruption appeared on the skin. He was returned to duty on the 14th.

Case 54.—Private Frank Teats, Co. C, 5th N. Y. Cav.; age 22; was taken sick Sept. 19, 1861, with giddiness, chills, epistaxis and pain in the back, and admitted on the 23d as a case of remittent fever. His face was flushed,

eyes suffused, pulse 85, quick and strong, skin hot and moist, tongue slightly white in the middle and red at the edges, appetite lost, bowels unmoved. He had headache, a slight cough and hurried respiration, 25 per minute. A small dose (one and a half drachms) of sulphate of magnesia with one-eighth of a grain of tartar emetic was given, and Dover's powder ordered to be taken at bedtime. He rested well, had one stool during the night, and next morning his countenance was natural. In the evening the face was again flushed, the eyes dull, pulse 92, tongue moist and white but with the papillæ at the tip projecting; appetite small. He had headache, cough with difficulty of expectoration, and a pain in the chest and abdomen from having taken capsicum by mistake. Six grains of quinine and three of Dover's powder were given every two hours until three such doses were taken. On the 25th there was no fever nor headache; the skin was warm and moist, the tongue moist and coated light brown, the pulse 98; the bowels were moved once; there was epistaxis at night. Next day the pulse was 78, and there was one stool with gurgling in the right iliac region and dysuria, but the cough had ceased and the appetite had returned. Extract of buchu was given. He was returned to duty on the 30th.

Case 55.—Private Samuel Cunningham, Co. H, 12th Pa. Vols., was taken about Sept. 1, 1861, with weakness, headache, nausea and pain in the bones, and was admitted on the 5th as a case of remittent fever. His tongue was flabby, white-coated and red at the edges, pulse 90, face flushed, skin moist and hot, bowels constipated. His fever was reported to be worse in the morning than in the evening. A dose of Epsom salt was followed by six large thin stools. Quinine was given. Next day he had two small stools, and on the 7th his bowels were quiet. On this day the morning pulse was 84, the evening 68, full on both occasions; and there was headache with flushed face, a pale white-coated tongue and anorexia. Dover's powder was given at night. On the 8th the morning pulse was 66, the tongue coated white in the middle, the face slightly flushed and there was some giddiness. In the evening the pulse had risen to 74, the tongue was clean, and an eruption, stated as owing to the poison of the rhus toxicodendron, appeared in confluent patches. After this he rested well and had no fever. Bicarbonate of soda was applied to the eruption, which faded in four or five days. On the 12th the patient's appetite was good and he was walking about. On the 13th he was transferred to hospital at Baltimore, Md.

Case 56.—Private John Hoadley, Co. B, 12th Pa. Vols., was taken with headache and pain in the bones about Aug. 29, 1861, together with a daily recurring chill and fever, and a diarrhœa causing about six stools daily. He was admitted September 5 as a case of remittent fever. The tongue was pale, flabby and coated, the face flushed, the skin warm and moist, the pulse 86, the bowels loose. A small dose of tincture of opium was given. Next day quinine was ordered, with Dover's powder at night. He had no chill after admission, but there was an evening exacerbation of fever, which on the 9th and 10th was accompanied by drowsiness and stupidity. On the morning of the 11th the remission was very marked, and in the evening the appetite became improved. On the evening of the 12th the tongue, which had been flabby and coated hitherto, became clean. The bowels were relaxed throughout the attack, but there was no tenderness except on the 9th, in the umbilical region. On this day also there was a slight cough with a stitch in the right side. The diarrhœa abated with the decline of the fever and the cleaning of the tongue. The patient was transferred to hospital at Baltimore, Md., on the 13th.

Case 57.—Sergt. Byron Hinman, Co. G, 24th N. Y. Vols.; age 24; was admitted Sept. 25, 1861, with remittent fever which he had contracted about four weeks before. He had headache with flushed face, suffused eyes, a quick pulse, 82 per minute, and a warm but moist skin, a slight cough, anorexia and moist yellow-coated tongue. A six-grain dose of blue-pill was ordered, with Dover's powder at night. Next day there was some umbilical tenderness; sixteen grains of quinine were given in the forenoon and a small dose of castor oil; two stools were passed. On the 27th the face was not so much flushed and there was some return of appetite. The patient was dizzy and in the afternoon had a free perspiration. The quinine was repeated on the 28th, but the headache, anorexia and foul tongue were not removed until October 1, after a second mercurial dose with castor oil. He was returned to duty on the 9th.

Case 58.—Private H. Hardridge, Co. F, 6th Wis. Vols., was admitted Oct. 30, 1861. Diagnosis—remittent fever. Since October 23 the patient had headache, weakness, pain in the back, some loss of appetite and much thirst. On the day of admission he had a slight chill followed by fever. Quinine was given. He rested well but not until after midnight, and next morning the skin was warm and moist but jaundiced, and the tongue soft, pale, moist and coated, the pulse 86 and bowels quiet. Calomel and morphia were given three times during the day. Quinine in six-grain doses three times daily was substituted on November 1 and continued until the 7th. The patient was returned to duty on the 15th.

Thirty-five Typhoid Fever Cases with more or less Evidence of the Existence of Malarial Affection.

Case 59.—*Relapse manifested by diarrhœa, eruption, wakefulness and increased temperature.*—Sergt. George M. Cook, Co. G, 3d Mich. Vols.; age 23; was admitted Oct. 19, 1861. He had previously suffered from rheumatism, intermittent fever and enteric fever, and while convalescing from the last, about October 14, he was seized with a chill followed by fever and perspiration, wakefulness, thirst, diarrhœa and pain in the bowels. His case on admission was diagnosed typhoid fever. On the 20th he was wakeful, his eyes dull, cheeks not flushed, pulse 66, full and strong, skin somewhat above the natural temperature, tongue red, slightly moist and with a few yellowish patches in the centre, appetite poor; he had six stools with some general abdominal tenderness and tympanites. A few rose-colored spots appeared next day, but otherwise his condition was unaltered. On the 22d he slept well: the pulse rose to 74 and was regular and strong; the skin was of the natural temperature: the tongue flabby and patched with a white fur; the appetite continued poor and the diarrhœa active, the abdominal tenderness being more marked on the right side. After this the diarrhœa gradually lessened, the tongue became clean and the appetite good. Up to the end of the month he was troubled with a slight cough with yellowish expectoration. He was returned to duty Nov. 7.

CASE 60.—*Light febrile attack following intermittent fever, but not influenced specially by the action of the malarial poison; debility, drowsiness and diarrhœa.*—Teamster Edward C. Ledley, 2d Mich.; age 23; had chills and fever with diarrhœa since the middle of August, 1861, but attended to his duty as an ambulance driver until September 6, when he was admitted as a case of typhoid fever, presenting chills, increased local and general heat, anorexia, muscular debility and pain in the head and bones. On the 14th he was drowsy and had headache: pulse 78, tongue moist, red at the tip and brown in the centre, appetite returning. Next evening the headache continued and he had two stools; but after this the bowels became regular, the skin moist and warm, the tongue moist and clean, the pulse natural, the sleep sound and the appetite and strength improved. He was returned to duty on the 30th. Dover's powder and turpentine emulsion, with quinine towards the end, formed the medication.

CASE 61.—*Dizziness, wakefulness, rose-colored spots and diarrhœa; improvement about end of 2d week.*—Private A. A. Rich, Co. G, 5th Vt. Vols.; age 17; was admitted Nov. 1, 1861. Diagnosis—debility. He had been sick about a week, first with chills, afterwards with fever. On admission he was wakeful and had headache, dizziness, buzzing in the ears, anorexia, thirst, vomiting, diarrhœa and cough. Next day the wakefulness continued; pulse 100, quick, full and firm; skin hot and presenting a few rose-colored spots on the chest; there was slight headache with tinnitus aurium; the tongue was slightly moist and furred white, but red on the tip, edges and central line; the appetite was good, but there was considerable thirst; the bowels were slightly relaxed, tympanitic and tender on pressure in the umbilical and left iliac regions; there was also some cough with frothy sputa. He slept well during the following night, and on the morning of the 3d the pulse was reduced to 80, but otherwise the symptoms continued as already stated. Treatment was by sulphate of quinine and astringents. On the 6th the diarrhœa became suddenly aggravated, five stools having been passed in the twenty-four hours, accompanied with abdominal tenderness and gurgling. Next day three stools were passed and on the 8th one stool. Improvement was progressive after this, but on the 18th, when the patient was transferred to Baltimore, Md., there was still some heat of skin, with slight abdominal tenderness and some cough. [He was returned to duty Jan. 27, 1862.]

CASE 62.—*Slight diarrhœa; dizziness; rose-spots on 10th day; improvement at end of 2d week.*—Private George W. Olney, Co. A, 4th Mich.; age 18; became sick about Sept. 9, 1861, with weakness, headache, diarrhœa and slight fever without chills, and was admitted on the 16th. Diagnosis—typhoid fever. He had epistaxis; his pulse was 70 and full; skin warm and moist; tongue pale, flabby and slightly coated white; bowels quiet. Ten grains each of calomel and jalap were prescribed. He had three passages from the bowels during the night, and next day the skin was warm and sweating. Rose-colored spots appeared on the 18th, and the tongue began to clean; there was some dizziness but no mental dulness; two thin large stools were passed, and there was tenderness in the right iliac region. On the 19th the pulse was 76; tongue tremulous, pale at the edges and coated in the middle; bowels quiet; skin hot and moist. Quinine was given. Next day the skin was natural; there was no tenderness nor tympanites; the countenance was pleasant and the eyes bright. A few dark rose-colored spots appeared on the 22d. The bowels remained quiet until the 23d, when they were moved seven times, but there was no accompanying tenderness, meteorism nor gurgling; the appetite was good, the tongue pale, gray in the centre but cleaning at the tip. Opiate enemata controlled the diarrhœa and the patient improved on tonics and stimulants. He was able to walk about on October 1, when he was transferred to Annapolis, Md.

CASE 63.—*Mental dulness; rose-spots on the 9th day, disappearing on the 16th; bowel affection slightly marked.*—Private John Dickerson, Co. A, 4th Mich.; age 24; was taken about Sept. 9, 1861, with pain in the bones, back and head, fever which was said to be worst at noon, and diarrhœa. He was admitted on the 16th. Diagnosis—typhoid fever. In the evening the fever was slight; pulse 74; skin warm and dry; face flushed; tongue red at the edges, coated yellowish at the base and in the middle, moist and with prominent papillæ; a bitter taste was felt in the mouth; one stool was passed during the day, and there was some umbilical tenderness. Two grains each of calomel and jalap were given. Next day the pulse was 70 and small; the skin dry; the tongue dry, heavily coated and brownish; the cheeks flushed; the patient was weak and dull; his bowels had been moved once; a few characteristic rose-spots were seen. Quinine was ordered. During the next week there was little change in the patient's condition: his eyes were injected and half closed and he was dull and drowsy, answering questions in a low tone; the face was flushed and the skin hot, dry, husky and profusely spotted with the rose-colored eruption; the tongue, heavily coated and brown, became moist on the 13th; the bowels quiet and neither tender nor tympanitic; there was some headache with dizziness at this time. On the 22d the patient was dull; his pulse 86 and feeble; face flushed; skin hot, moist and spotted; tongue red at tip and gray in centre; he vomited once during the day and had one stool. Next day the pulse was 82 and weak, the eyes suffused, the skin warm and moist, the tongue gray in the centre and red at the tip, the bowels quiet and not tender. On the 24th the pulse was 78, the skin warm and soft, the tongue moist and slightly coated gray, the appetite good. Wine was occasionally given. He was returned to duty October 24.

CASE 64.—*Onset decided by presence of tonsillitis; headache, deafness and tinnitus; disease marked chiefly by abdominal symptoms; anæmia attending with perspirations.*—Private G. W. Conger, Co. B, 19th Ind.; age 20; was admitted Sept. 4, 1861, with a high grade of inflammatory fever, presenting marked remissions and accompanied with flushed face, bloodshot eyes, hot and moist skin, yellow-coated tongue, regular bowels, anorexia and slight tonsillitis. Quinine and a gargle were ordered. On the 7th the fever lost its remittent character and was accompanied with headache, dry tongue and frequent stools; pulse 80. Turpentine emulsion, beef-essence and milk were substituted for the quinine. On the 14th diarrhœa, tympanites and tinnitus aurium were noted; pulse 88. Dover's powder was given at night. The patient rested well and had some appetite next morning; the bowels were quiet, but the skin was hot and dry and the pulse 108; a slight eruption had appeared on the penis and scrotum. In the evening the pulse was 106, the tongue moist and slightly coated; the patient had two stools and some tympanites during the day. The Dover's powder at night was continued. On the 16th the bowels were regular and there was some appetite;

pulse 75 and skin moist. On the 17th the tongue was cleaning, the appetite good, the pulse 80 and the bowels regular. Dover's powder was continued. On the 18th the report is varied by noting abdominal tenderness with one stool, and on the 19th by dryness of skin, the tongue continuing moist, slight deafness, cough, respiration increased to 24 per minute and bowels tympanitic, slightly tender in the right iliac region and moved twice. Twelve grains of quinine were given. Copious sweating occurred during the night and sudamina appeared, the bowels again becoming regular and the respiration natural. On the evening of the 22d pain recurred in the abdomen with two stools, dryness of skin, some headache and increase of the pulse to 100. Next day two stools were again reported, but the skin had recovered its moisture and the tongue was natural. On the 24th there was slight deafness but no cough nor pain; the tongue and skin were in natural condition and the appetite good. Again on the evening of the 26th, with an acceleration of the pulse and dryness of skin, there was abdominal pain with borborygmus, followed by free perspiration during the night. From this date to October 1, when he was transferred to Annapolis, Md., the patient slept well, had a good appetite, moist and clean or yellow-patched tongue and natural skin; but there was more or less abdominal pain with from two to four stools daily.

Case 65.—*Date of onset obscured by sequelæ of measles; deafness and tinnitus aurium; diarrhœa and rose-colored spots; convalescence.*—Private C. Mills, Co. E, 6th Wis.; age 22; had measles in August, 1861, and about September 1 was taken with chills, fever, diarrhœa, cough and headache, for which calomel and opium had been administered. He was admitted October 1. Diagnosis—typhoid fever. Turpentine emulsion and astringents were ordered. He slept but little, and next day was looking dull and had slight headache and congestion of the face; pulse 90, quick; skin natural; tongue moist, heavily coated brown; appetite moderate; he had a bad cough with slight expectoration; three stools were passed and micturition was difficult. Cough mixture was given with small doses of blue-pill and opium every two hours. On the 3d the skin was moist and covered on the left side of the chest and abdomen with a profusion of rose-colored spots. Next day deafness and tinnitus aurium were noted. On the 5th the pulse was 85, full, the skin cool and moist, the tongue moist and having a yellowish patch in the centre, the appetite poor; one stool was passed, and there was some tenderness in the left iliac region; respiration was natural although there was much cough and free expectoration. Four stools were passed on the 6th, six on the following day, and three daily after this until the 11th, when there was but one; during this time the expression was dull, the face somewhat congested, the tongue moist, white and flabby, and the appetite poor. On the 11th the tongue became clean and the appetite good. Tincture of iron was ordered. He slept well during the night, and next day his eyes were bright, cheeks not flushed, pulse 90, regular, skin natural, tongue moist, slightly coated white, appetite good. On the 14th he was transferred to Baltimore, Md.

Case 66.—*Chill and remitting fever; rose-spots on 12th day; drowsiness; sordes; cough; diarrhœa and iliac tenderness; record unfinished.*—Private J. M. Foster, Co. A, 6th Wis. Vols.; age 21; was admitted Nov. 1, 1861, as a case of typhoid fever. Late in September he had measles, and on October 24 was taken with a chill followed by fever, weakness, anorexia, pain in the back and bones, nausea, vomiting and diarrhœa, which continued up to the date of his admission. He said he felt better about noontime daily. On November 2 he was dull, his eyes slightly suffused, pulse 112, quick and of fair strength, skin soft and moist, tongue soft, coated in the centre and at the tip, teeth covered with sordes; he had anorexia, much thirst and a diarrhœa of four stools daily, with some abdominal tenderness and some cough. Quinine in five-grain doses was given three times daily. Next day his condition was unchanged but on the 4th the pulse became reduced to 100 and lost its quickness and strength, the skin was hot and covered with minute rose-colored spots, the tongue moist and brown, eyes injected and the respiration labored. The patient continued dull and drowsy on the 6th, and the diarrhœa persisted, with some tenderness in both iliac regions; but the tongue appeared cleaner at the edges and the respiration was natural. On the 7th the pulse was 108 and weak, the skin dry, husky and covered with rose-colored spots, the tongue dry and brown, the gums and teeth blackened, the bowels loose, tympanitic, tender and gurgling on pressure. The record leaves the patient in this condition on the 8th, and closes with the remark that he was transferred to Philadelphia, Pa., Feb. 15, 1862.

Case 67.—*Headache; epistaxis; hebetude; abdominal symptoms not marked; rose-spots on the 9th day, with perspirations and sudamina about the beginning of the 3d week, accompanying defervescence.*—Sergeant John Evans, Co. H, 12th Pa., had a chill on the morning of Aug. 30, 1861, followed next day by fever which increased towards evening, and was associated with headache and pains in the bones and small of the back. To these symptoms, on September 2, epistaxis, lassitude and a tendency to stupor were added; but the bowels remained regular and urination free. On the 4th he was admitted to hospital as a case of typhoid fever: pulse 78, skin hot and dry, tongue coated white, bowels constipated and tender on pressure. Two grains each of compound cathartic mass and blue-pill were given at once, with sulphate of quinia, by which the bowels were moved three times. He rested well during the night, and on the morning of the 5th his pulse was 80, skin warm and moist, but his tongue was dry, red, coated and flabby, and he complained of pain in the limbs. During the day he had three small thin stools, and in the evening the pulse was 72, the tongue red, flabby and coated white, the skin dry and warm; there was also some dizziness. A ten-grain dose of Dover's powder was given. During the progress of the disease there was but little variation in the pulse; it did not go over 80, and on the 11th fell to 64, coincident with a warm moist skin and the development of an abundant crop of sudamina on the abdomen and shoulders. The skin was warm and generally dry, but sometimes it felt moist; it was covered with perspiration on the 11th and 14th, after which latter date it was generally either cool or natural. The tongue became brown-coated and dry on the 7th coincident with the occurrence of anorexia and some obtuseness of the intelligence followed by drowsiness; it became moist again, but very red and coated on the next day, when also the appetite showed signs of return, and a few rose-spots were noted on the abdomen, with slight tenderness and borborygmus in the right iliac fossa, but it was not until after the appearance of the sudamina on the 15th and 16th that the mental hebetude was removed. The bowels were not notably loose at any time save

immediately after admission, as already related; but there was a tendency to laxness, as two drachms of castor oil on the 3d produced two thin stools:—on the other hand, ten grains each of calomel and jalap on the 14th, after producing three thin stools, created no further disturbance of the intestinal tract. During the night of the 6th he had a colic, which was relieved by the application of mustard. On the 16th, as a slightly jaundiced hue of the face was apparent, small doses [illegible] of blue-pill and opium were given with port wine three times daily. After the 23d the patient did some light duty about the wards, and was returned to his command October 5.

Case 38.—*Hepatic tenderness; rose-colored spots; slight diarrhœa and hepatic tenderness, but no diarrhœa nor rose-colored spots; improvement after the 3d week.*—Private W. Hunter, Co. F, 74th N. Y. Vols.; age 18; was admitted Nov. 2, 1861, having been taken sick two weeks before with chills, anorexia and pain in the back. The case on admission was diagnosed as typhoid fever. On the 7th the patient was dull and stupid, his eyes suffused, cheeks congested, pulse [illegible], skin hot and dry, tongue dry and pasty, lips and teeth covered with sordes, appetite lost: there was some tenderness and gurgling in the right iliac region: twelve grains of quinine were given at once, followed after a time by a half-ounce dose of castor oil and by turpentine emulsion every three hours. Next day one stool was passed; the patient had some cough and hepatic tenderness, and vibices appeared on the chest. On the 6th he had tinnitus aurium. On the 8th he seemed better: his tongue was red at the tip and edges and coated white in the centre; his bowels had been moved [illegible] after admission. He improved gradually after this, and was transferred to Baltimore, Md., December 3.

Case 39.—*Hepatic tenderness; general tenderness; scanty rose-spots; diarrhœa and general abdominal tenderness; headache; delirium; sordes; prostration; inflammation of parotid; rose-spots and vibices; discharged on account of typhoid fever.*—Private Patrick Devine, Co. K, 3d Vt.; age 18; was admitted Oct. 1, 1861, with typhoid fever. He had been taken, September 29, with headache, fever, weakness and epistaxis, which last had been of frequent occurrence during the previous month, and on the 28th with retention of urine. On October 2 the patient's face was congested; his eyes dull and heavy; pulse 112, quick and strong; skin hot and dry; tongue moist and coated brown; teeth covered with sordes, principally around the gums; he had difficulty in urination; he had headache and pain in the back, with tenderness over the whole of the abdomen and slight borborygmus. Repeated doses of calomel and opium, with turpentine emulsion, were given. Ipecac, extract of henbane and sweet spirit of nitre were administered on the 4th, and beef-essence, milk-punch and astringents on the 6th, as diarrhœa began to be a prominent symptom. On the 7th the pulse was 80 and strong, the skin natural, the tongue slightly moist, red at the tip and edges, heavily coated brown and fissured in the centre and at the base; eight stools were passed, and micturition was difficult. Rose-colored spots appeared on the following day; there was some mental dulness with headache and occasional delirium; cough was troublesome, and the diarrhœa was accompanied with general abdominal tenderness which was especially acute in the right iliac region. Ipecac was omitted on the 10th, and next day the bowels were quiet. With the moderation of the diarrhœa the tongue became flabby and pointed, dry and brown-coated in the centre, although the appetite improved. Epistaxis occurred on the 14th, with headache and delirium; the tip and edges of the tongue became red, the teeth encrusted with sordes, and the bowels moved in five stools daily. Next day the nose bled again, some rose-colored spots appeared, and the patient was unable to protrude his tongue on account of swelling of the parotid gland. Epistaxis, profuse perspiration and vibices on the neck and chest, with headache and increased swelling of the parotid, but no delirium, were noted on the 17th; the diarrhœa continued with general tenderness and some borborygmus, especially marked in the right iliac region. Vibices were numerous on the abdomen on the 18th, and fresh rose-spots appeared on the 20th, 22d, 23d, 25th and 28th: during these days the diarrhœa moderated, but the tenderness continued, being sometimes general and at others specially marked in the umbilical and right or left iliac regions; some headache and cough were noted but no delirium; the appetite was good, the skin generally moist, and the tongue moist and but slightly coated. The patient continued unable to protrude his tongue. Epistaxis recurred on the 29th, and on November 2d, 4th, 6th and 8th, during which days there was some heat and dryness of skin, with headache and tinnitus, relaxation of the bowels, abdominal tenderness and coated tongue, the appetite continuing good and the cough subsiding: pulse 80 to 100. No change took place in his condition up to the 18th, when he was transferred to Annapolis, Md. [whence he was discharged on the 29th on account of typhoid fever].

Case 40.—*Severe diarrhœa and abdominal pain: free perspirations; mental dulness; rose-spots from 15th to 30th day; tongue flabby and yellow-coated: improvement in 5th week.*—Private Byron Steinback, Co. A, 1st Pa. Art.; age 21; became attacked on Sept. 27, 1861, with weakness, pain in the head and limbs and diarrhœa, on October 2 with chills and fever, and on the 3d with epistaxis and some retention of urine. He was admitted on the 9th, on the evening of a sixth day, to be found to be weak, having had ten stools, with general abdominal tenderness and some retention of urine; a few rose-spots were scattered on the chest and abdomen; the face was slightly flushed, the eyes injected and suffused and their lids closed, the skin of natural temperature, pulse 80, tongue moist, red at the tip and edges, heavily coated on the dorsum, appetite deficient: he had some cough and pain in the limbs. On the 10th there was much thirst, the skin was hot and dry, but few rose-spots had appeared: the tongue was moist and flabby, red at the tip and edges and heavily coated yellow in the centre; six stools were passed. Tincture of iron was given three times daily. On the 11th the skin was covered with perspiration, the rose-spots had increased in number, the bowels were moved twice and there was tenderness of the epigastrium and in the iliac regions, markedly on the right side, with some borborygmus and audible gurgling. Turpentine emulsion was given every three hours. On the 12th the patient was reported as having eaten well, he was dull and stupid, his eyes dull and injected; cheeks somewhat flushed; pulse 72, regular, soft, full and positively accented, with rose-colored spots; tongue slightly moist, red at the tip and edges, coated yellow in the centre; lips and teeth covered with sordes; appetite poor; his bowels were moved six times and there was tenderness, naturally about the umbilicus. Astringents were given, but the diarrhœa continued. On the 16th, 17th and 17th profuse perspirations were noted, and rose-spots, perceptible to the

touch, continued to erupt. A few of these spots appeared on the forehead on the 22d and a few more on the chest two days later. On the 22d the diarrhœa was controlled: one stool only was passed instead of three, four or more, as on previous days; but the general abdominal and extreme umbilical tenderness was not relieved until some days later. Meanwhile the tongue became clean, the skin natural and the appetite good. The cough, which had affected the patient more or less from his admission, now assumed prominence as a symptom, and was accompanied with mucous expectoration. He was transferred November 1 to Annapolis, Md. [whence he was discharged from the service on the 29th because of debility].

Case 71.—*Headache; deafness; diarrhœa; cough; rose-colored spots following paroxysmal fever.*—Private F. Cameron, Co. F, 74th N. Y.: age 23; was admitted Nov. 2, 1861, as a case of typhoid fever. He became sick about October 1 with chills, fever and sweating, epistaxis, headache, anorexia, thirst, diarrhœa and irritability of stomach. When admitted his eyes were dull and somewhat injected, cheeks slightly flushed, pulse 75, regular but weak; a few rose-spots on the chest; tongue red, dry and fissured in the centre; lips and teeth covered with sordes; appetite poor; he was a little deaf and had buzzing in his ears; one stool was passed with much right iliac and umbilical tenderness and tympanites; he had also a slight cough with some whitish expectoration. He slept none during the night and had but one stool on the 3d; the tenderness lessened and the cough ceased. Beef-essence, punch and turpentine emulsion were given. After this the bowels continued quiet, and on the 7th the tongue began to clean and the appetite to return. He was transferred to Annapolis on the 8th [whence he was discharged for disability on the 29th].

Case 72.—*Cerebral manifestations slight; rose-spots on the 8th day with successive crops to 22d day; diarrhœa ceasing on occurrence of free nocturnal perspirations on 17th day.*—Private Peter Martin, Co. B, 3d Vt. Vols.: age 18; was seized Sept. 28, 1861, with chills, fever and pain in the head, back and limbs, for which he was admitted October 3. His pulse was 85, full and strong: skin natural: tongue moist and furred yellowish. He was somewhat dull and had pain in the head, anorexia and relaxed meteorized bowels. Blue-pill was given with opium every two hours. Rose-colored spots appeared on the chest and abdomen on the 5th, and on the 7th were very profuse. The tongue, from being covered with a thick yellow fur, became red at the tip and margins, remaining coated on the dorsum. The diarrhœa caused three or four stools daily, and was accompanied by tympanites and right iliac, umbilical and, indeed, general abdominal tenderness. Sixteen grains of quinine were given on the forenoon of the 7th. The headache, anorexia and other symptoms as stated continued until the 14th, when, after a free perspiration during the night, the pulse fell to 66, the bowels became quiet and the appetite returned; the tongue, however, remained coated heavily with a moist yellow fur at the base and centre. A small dose of blue-pill was given on the 16th, but the fur was not removed until the 23d. Rose-spots appeared on the 16th and again on the 19th. Nocturnal perspirations were recorded on the 17th and 19th. Some cough occurred during the progress of the case. The patient was returned to duty on the 28th.

Case 73.—*Dizziness and slight headache; diarrhœal tendency not marked; rose-colored spots on the 10th, 19th and 30th days, and vibices on 19th.*—Corporal J. B. Morgan, Co. E, 1st Pa. Rifles; age 24; was healthy until about Oct. 1, 1861, when he had chills, fever and profuse sweating, with pain in the head, dizziness, epistaxis, pain in back, limbs, shoulder and chest, some cough, diarrhœa and retention of urine. He was admitted October 10 as a case of typhoid fever. The pulse on admission was 90 and quick; the skin hot and dry, exhibiting a profuse eruption; the tongue was slightly moist, red and clean; the appetite poor; the bowels unmoved but somewhat tender and tympanitic; the patient had slight headache, cough and pain in micturition. Wine and cinchona bark were ordered. The eruption faded, but no other change took place until the 13th, when the tongue became dry. One ounce of Epsom salt was given. Three stools were passed on each of the two following days, and the tenderness became more marked in the right iliac region; otherwise there was no change. The Epsom salt was repeated on the 16th. Three stools were passed on the 17th and one on the 18th. Vibices appeared on the chest and rose-spots on the abdomen on the 19th. A few more rose-spots were detected on the 30th. During this period the skin was generally of the natural temperature, the tongue moist, red and clean and the appetite good. On November 1 the patient was transferred to Annapolis, Md., where his case was entered as one of debility, and whence he was returned to duty on December 2.

Case 74.—*Dulness and drowsiness for a day or two; diarrhœa and dry skin persisting; rose-colored spots and vibices; tongue flabby and coated yellow; moist skin, and convalescence on 38th day.*—Private William Morrison, Co. E, 1st Pa. Rifles; age 38; had a chill about Oct. 1, 1861, followed by fever and perspiration, slight headache, anorexia and some cough. He was admitted on the 10th as a case of typhoid fever. Next day he was dull and drowsy, but without any sign of congestion about the face; his pulse was 80 and feeble, skin hot and dry, tongue slightly moist, red at the tip and edges and heavily coated with yellowish fur in the centre; he had intense abdominal tenderness, but only one stool during the previous twenty-four hours. Emulsion of turpentine and tincture of iron were ordered in repeated doses. On the 12th the eruption appeared; the skin was of natural temperature, the tongue slightly moist but coated with yellowish fur, and the appetite good; two stools were passed, and the patient had some abdominal tenderness and cough. He slept well and next day was brighter mentally. From this time till the end of the month his general condition remained unchanged. The tongue was flabby and always more or less yellow-furred; the appetite usually good; the bowels moved from one to seven times daily, with general and occasionally umbilical and left iliac tenderness, and with slight tympanites on the 10th and 29th; the skin, usually hot and dry, showed some vibices on the 19th and 20th; on the 22d rose-colored spots appeared on the face and did not fade until the 29th, when some epistaxis occurred; there was more or less cough with some mucous expectoration; the pulse beat generally about 75 per minute. On the 30th quinine was ordered in three-grain doses every two hours. Next day the pulse was lowered from 80 to 60, and the diarrhœa increased from one to seven stools; otherwise the patient's condition appeared unaltered. Astringents were given, and in the course of four or five days the diarrhœa became lessened to one or two stools daily. On November 4 a boil appeared on the patient's forehead. On

the 7th the skin is recorded for the first time as being moist; pulse 75; tongue cleaning; appetite good; bowels tender and moved twice. Cod-liver oil and wine were ordered on the 10th. The daily record of symptoms ceases on the 11th. The patient was transferred to Alexandria, Va., December 20.

CASE 75.—*Successive crops of rose-colored spots from 10th to 36th day; perspirations; diarrhœal tendency slight; gastric irritability; convalescence on 38th day.*—Private S. B. French, Co. B, 6th Wis.; age 25; is said to have had typhoid fever in 1859. On Sept. 24, 1861, he was taken with chills and fever, headache, pains in the back and limbs and diarrhœa, for which quinine was given. He was admitted October 1. Next day his face was somewhat congested, eyes bright, pulse 100, quick and strong, skin hot and moist, edges of the tongue dry and its centre covered with a brown crust, appetite small; three stools were passed, and there was some cough with viscid mucous expectoration. Turpentine emulsion and astringents were given. Rose-colored spots appeared on the 3d and continued to erupt at intervals until the 29th. The skin was generally moist; but on the 6th and 7th free perspiration occurred accompanied with sudamina; tinnitus aurium also was noted at this time, and the pulse fell to 75. The bowels were moved once or twice daily, and there was more or less tenderness, chiefly umbilical and left iliac. Five stools were passed on the 10th and again on the 15th, but the tendency to diarrhœa was not marked, for three grains of blue-pill repeated twice on the latter day, and six grains of compound cathartic pill repeated twice on each of the two following days, did not aggravate it; the bowels were generally moved twice, but sometimes only once daily to the end of the record. Profuse nocturnal perspiration occurred on the 15th and following days. The tongue on the 8th became red at the tip and edges and brown or yellowish-brown in the centre; on the 10th it became slightly dry in the middle; on the 17th red, moist, flabby and with prominent papillæ, and after this more or less coated to the end. The appetite continued good from the second day after admission, but on the 26th and 27th there was some irritability of stomach. Quinine was given at this period in three-grain doses every two hours. On the 29th the patient slept well; his eyes were bright; cheeks not flushed; pulse 78, regular; skin hot and moist, a few rose-spots appearing on the breast and abdomen; tongue red at the tip and edges, yellowish coated and fissured in the centre; appetite good; one stool was passed; the stomach continued irritable, and there was some cough with yellow expectoration. On the 31st he was sitting up; the gastric irritability and the cough had ceased. On November 1 he was transferred to Annapolis, Md. [whence he was discharged on account of atrophy of the leg, March 28, 1862].

CASE 76.—*Record imperfect during first four weeks; delirium; diarrhœa; rose-spots from 29th to 39th day; convalescence on 40th day.*—Private Peter Courtwright, Co. B, 1st Pa. Rifles; age 27. This man stated that he had suffered from some kidney trouble at the age of 20, and afterwards from both liver and kidney disease. About Sept. 12, 1861, he had chills followed by fever and sweating, with epistaxis, pain in the back and limbs and anorexia. He was admitted October 10, when he seemed stupid; his eyes were dull; cheeks flushed; pulse 90 and quick; skin hot and dry; tongue moist, red at the tip and edges, coated whitish in centre; appetite poor; the bowels quiet, but with some gurgling and slight tenderness in the left iliac and umbilical regions; a few rose-spots were noted. Dover's powder was given. On the 11th and 12th the general condition remained unaltered; the skin lost its heat but continued dry. Tincture of iron was ordered to be taken three times a day. On the 13th the eyes were dull, injected and suffused and the cheeks slightly flushed; the pulse had fallen to 60; a few rose-spots appeared on the chest and abdomen; three stools were passed, and there was pain on urinating. Profuse perspiration occurred during the night, and in the morning the patient looked bright but there was some mental derangement; the pulse was 46, full and firm; six stools were passed. Astringents were ordered. The condition on the 15th is not recorded, but on the following day there were more rose-spots, delirium, tinnitus aurium, six stools and umbilical tenderness; pulse 68. Tenderness and tympanites over the tranverse colon accompanied six stools recorded on the 17th. There was less delirium on the 18th; the face had become pale and the eyes sunken; one stool was passed. Three stools were reported on the 19th and six on the 20th, on which day also some rose-spots appeared. On the 21st, after sleeping well, the patient's tongue, which had heretofore been red at the tip and edges and more or less coated in the centre, was found to be clean and natural, his skin of normal temperature, pulse 70 and appetite good; two stools were passed. After this he improved, but a diarrhœa, causing about three stools daily, persisted until November 4, when the bowels were reported regular. He was able to be up and to walk about October 30th, and was returned to duty November 10.

CASE 77.—*Delirium, diarrhœa and involuntary stools; eruption of rose- and dark-colored spots; improvement about end of 4th week, but debility with flabby tongue continuing after defervescence.*—Private B. T. Conglin, Co. G, 5th Wis. Vols.; age 22; was taken about Sept. 16, 1861, with epistaxis, headache, pain in the limbs and back and diarrhœa, and was admitted October 1 as a case of typhoid fever. On the 2d his face was congested and he looked dull; his pulse 90, quick and strong, skin normal and tongue moist, brown and with prominent papillæ; he had some pain in the back and anorexia, but no movement from the bowels; the abdomen was covered with dark spots (vibices?) and showed a few rose-spots, which latter disappeared on pressure; he was delirious. Emulsion of turpentine was given every two hours, tincture of iron three times daily and beef-essence as required. Five involuntary stools were passed on the 3d, and astringents were administered. The passages were frequent but passed voluntarily on the 4th; the abdomen and chest were covered with dark-colored spots imperceptible to the touch and disappearing on pressure; the tongue was dry and brown and there was some hoarseness. The stools became again involuntary on the 5th, and the teeth and lips covered with sordes. The patient's face was congested, eyes dull, skin hot and showing the remains of the dark-red spots. He had anorexia, slight tympanites and iliac tenderness; pulse 100. Beef-essence and punch were ordered, with Dover's powder in the evening. Involuntary micturition and defecation, with much tenderness, were noted on the 6th; pulse 112. The tongue was clean, red and dry on the 7th; the appetite improved and there was but one stool. During the three or four days which followed the tongue became moist and flabby, with prominent papillæ; the appetite continued to improve; the bowels were quiet, but there was much umbilical

and some iliac tenderness. On the 12th the pulse fell from 110 to 80, the eyes became bright and the delirium ceased. Next day the tongue was moist and clean and the appetite good; but until the end of the month flabbiness and prominent papillæ were reported. The patient was free from diarrhœa, but the abdomen was occasionally tender; at times he had headache. He was transferred to Annapolis, Md., November 1, as a case of debility [and was returned to duty Feb. 3, 1862].

Case 78.—*Record imperfect at beginning and end of case; headache; diarrhœa; abdominal tenderness; rose-colored spots.*—Private Gottfried Scrieber, Co. I, 6th Wis.; age 30; had some lung trouble in July, 1861, from which he had not entirely recovered, when about October 15 he was taken with chills followed by fever and sweating, with headache, tinnitus aurium, pain in the back, chest and limbs, lassitude, anorexia, thirst, diarrhœa, retention of urine and some cough. He was admitted November 7. Diagnosis—debility. On the 8th rose-colored spots appeared on the chest and abdomen, and there was much tenderness in the umbilical and left iliac regions with a burning feeling in the epigastric region. Blue-pill with opium, followed by castor oil, was prescribed. The skin on the 9th was covered with perspiration; the bowels were moved twice. On the 10th there were some rose-spots, a burning feeling in the stomach, tenderness in the umbilical and left iliac regions, but no passage from the bowels; the tongue was very red at the tip and edges. Eight grains of quinine were given with turpentine and tincture of iron. This patient was transferred on the 18th to Annapolis, Md. [Diagnosis—typhoid fever. Returned to duty Feb. 3, 1862.]

Case 79.—*Cerebral symptoms not marked; constipation; bilious vomiting; rose-spots on 14th and 18th days.*—Private Thomas Connell, Co. K, 3d Vt.; age 22; caught cold Sept. 27, 1861, and had headache, pain in the loins and limbs and anorexia. He was admitted October 3d as a case of gastritis. His eyes were suffused; pulse 95, full and strong; skin moist but somewhat hot; tongue dry, red and glossy; constipation, anorexia and great irritability of the stomach were present. Sulphate of magnesia and antimony were given, and ten grains of calomel in the evening. The Epsom salt was repeated on the 5th. Next day two grains of quinine were given every two hours, and tincture of iron on the 7th. One stool was obtained on this day; the gastric irritation had somewhat lessened; pulse 70. On the 9th the pulse fell to 45, the skin was of natural temperature, the tongue red, clean and moist but rather flabby, the appetite moderate and the bowels unmoved. Rose-colored spots appeared on the 10th; the appetite was poor; the bowels unmoved and tender. Two compound cathartic pills were given, with turpentine emulsion, every three hours, and two grains of quinine every hour. Next day one stool was obtained, and there was marked tenderness with gurgling in the right iliac and umbilical regions. Some irritability of stomach, cough, pain in chest, suffusion of eyes and congestion of face were noted on this day; pulse 50; skin natural; tongue moist, red and clean. On the 13th, the bowels having continued unmoved and tender in the interval, a cathartic enema was given; this was followed on the 16th by an ounce and a half of castor oil. Three stools were passed on the 17th, three on the 18th, and seven, twelve and fifteen on the following days, after which two stools were recorded daily for several days, with some abdominal tenderness. Rose-spots were noted on the 14th. The patient was sent to Annapolis, Md., November 1 [whence he was returned to duty December 2].

Case 80.—*Date of origin unknown; unconsciousness; rose-colored spots; moist tongue; diarrhœa; rapid convalescence.*—Private George Robinson, Co. B, 14th N. Y.; age 19; admitted Sept. 27, 1861, having been affected with diarrhœa for two months. Diagnosis—typhoid fever. He was partly comatose and difficult to arouse; pulse 80, firm, strong; face congested; eyes suffused; skin hot and soft; tongue moist, gray; abdomen tender and bowels moved twice. Calomel with kino was given. Next day the abdomen and chest were covered with rose-colored spots; the tongue was moist and coated, except at the tip and edges, with a rough brown fur; three stools were passed, and the abdomen was tympanitic and tender especially in the umbilical region; there was some purulent expectoration streaked with blood, but not much cough. No change took place until October 1, when sudamina appeared on the chest; the stomach became irritable, the bowels remaining undisturbed. Next day the patient looked better and had some appetite; his tongue was white at the tip and edges and brown at the base and centre. Turpentine emulsion was prescribed on the 4th. Profuse perspiration occurred on the 5th with sudamina, and on the 9th rose-colored spots appeared in fresh crops, which by the 11th were very profuse; headache, tinnitus aurium and deafness affecting the left ear accompanied the eruption, and the tongue, which had before been flabby and more or less patched with yellow, became red at the tip and edges and yellow-coated in the centre; he slept well, however, his appetite remaining good and his bowels undisturbed. On the 14th he was considered convalescent, and on the 21st was returned to duty.

Case 81.—*Unconsciousness; muscular twitchings; involuntary passages; sordes; diarrhœa during convalescence.*—Private Luther Howard, Co. B, 72d N. Y., was admitted Sept. 29, 1861, having been sick for two weeks. Diagnosis—typhoid fever. He was partly unconscious and unable to speak except occasionally; the face was congested, the eyes slightly injected, the facial muscles disturbed and those of the extremities twitching involuntarily in almost choreic movements; he had headache and some laryngeal trouble; the skin was soft and moist; the pulse 88, firm; the abdomen tender. Camphor and opium were given. Next day he was partly comatose, his face congested, pulse 100, full and strong, skin hot and soft; no stool was passed, but the abdomen was tympanitic and tender; no urine was voided for sixteen hours; the muscular twitchings continued, and the patient was unable to open his mouth or speak. Emulsion of turpentine, sweet spirit of nitre, valerian and Dover's powder were ordered. On October 1 sordes appeared on the teeth, the tongue was coated dark brown and the mouth filled with dark tenacious mucus; the patient was indifferent, but ate food when offered to him; the bowels were unmoved. Five grains each of calomel and jalap, with twelve of quinine, were given him. One small stool was obtained next day, and the patient was less stupid; he was very deaf, but answered questions correctly when put to him in a loud voice. On the 3d he protruded his tongue with less difficulty and the choreic movements were lessened, but there was some dysphagia and the stools were passed involuntarily. On the 4th he was rational; the tongue slightly moist; bowels

tender and moved once, but not tympanitic. Turpentine emulsion, brandy, Fowler's solution and Epsom salt were given. Two involuntary stools were passed on the 6th, but the dysphagia was lessened, the twitchings had ceased and the patient was able to articulate well and masticate his food. Beef-essence and astringents were ordered. Some headache and delirium were present on the 8th; the tongue was dry and tremulous, showing yellow patches and prominent papillæ, and the bowels were loose. After this the skin was usually hot and dry or of the natural temperature, although on the 18th there was some perspiration at night. The tongue was moist, clean or patched with white or yellow, and usually flabby and with prominent papillæ; but on the 13th it was red at the tip and edges and coated yellow in the centre. The appetite was good, and for several days was recorded as excessive. The bowels were loose, yielding two or three passages daily, with occasional tympanites and tenderness mostly in the right iliac region. He slept well, but was occasionally troubled with a little cough. Epistaxis occurred on the 30th, and on November 4, 5 and 6 there was some headache with dizziness and twitchings of the eyeballs. He was transferred to Annapolis, Md., on the 18th [as a case of typhoid fever, and was returned to duty December 27].

Case 82.—*Ague; gastric irritation; rose-colored spots; cerebral symptoms slightly marked; perspiration and periodic epistaxis.*—Private Fred. Shaffer, Co. G, 72d N. Y.; age 23; became affected in July, 1861, with ague which lasted for six weeks, after which he was confined to bed with abdominal pains. He was admitted September 29 as a case of typhoid fever. For some days after admission he rested well at night, but had from two to six stools daily with, but sometimes without, tympanites and abdominal tenderness, chiefly marked in the umbilical and left iliac regions; he had some congestion of the face and headache, and the pulse ranged from 85 to 100, being usually somewhat more rapid at the evening visit; his skin, which was natural or slightly moist with the lower pulse and usually hot and dry with the higher, presented a few rose-spots and a profuse eruption; he was troubled with anorexia and great irritability of the stomach; his tongue was moist and white or yellow-coated, or dry and brown; he had some difficulty in micturition and afterwards retention of urine. He was treated with turpentine emulsion, Dover's powder, astringents and small doses of calomel and opium. On October 5 he was restless at night; his face was congested, eyes dull, pulse 95 and weak, but his skin was cool and covered with perspiration. Next night he slept well and in the morning looked better; pulse 80, regular; skin natural; tongue moist, clean; appetite good; but the stomach continued irritable and much green matter was vomited; four stools were passed. Tincture of iron and astringents were given. From this time forward the record shows the presence of occasional headache with dizziness and tinnitus aurium. The stomach continued irritable, but after the occurrence of epistaxis on the 10th and free perspiration on the 11th, this symptom became less prominent and disappeared. The epistaxis recurred on the 13th, 15th, 17th and 21st. The tongue was always moist and generally clean, but flabby and with prominent papillæ. The bowels were loose, giving two or three passages daily, with decreasing tympanites, gurgling and general abdominal tenderness, sometimes particularly marked in the umbilical and right iliac regions; towards the end of the month the stools became reduced to one daily. On the 25th quinine in two-grain doses was given three times daily. The patient was transferred to Annapolis, Md., November 1 [as affected with typhoid fever, on account of which he was discharged from the service on the 25th].

Case 83.—*Chills; diarrhœa; umbilical pain; free perspirations; no notable cerebral symptoms.*—James Tobin, attendant; age 29; was admitted Sept. 11, 1861, having been taken sick ten days before with headache, constipation, pains in the bones and a chill and fever, for which quinine was administered. On the day after admission he was restless and had an anxious expression; he perspired during sleep, but when awake his skin was hot and dry; pulse 74; tongue pale but red at the tip and edges; four thin stools had been passed during the twenty-four hours, and there was slight pain, chiefly umbilical and during micturition; he had also a stitch in the side and some pain in the breast. Quinine was given. In the evening the pulse was 78, the skin hot but sweating and the tongue pale, flabby and somewhat brown; four stools were passed during the day. Acetate of lead and opium were prescribed. Next morning the pulse had fallen to 56 and the patient was sweating profusely. In the evening there was a slight accession of fever; only one stool was passed during the twenty-four hours. For some days after this the perspiration continued profuse, especially at night, although aromatic sulphuric acid was administered; the bowels remained quiet and the tongue flabby and coated gray or brown at the base. Blue-pill was given three times on the 15th, and in the evening of the 16th ten grains of calomel, which produced three painful stools, but the bowels thereafter became again quiet although tender especially in the right iliac region. The perspirations continued. Morphia was given at night and the patient was sponged with alcohol. On the 18th some pustules appeared on the abdomen. Next day he is reported as looking stout and healthy, with bright eyes and clear mind, although there was some headache and pain in the back and breast, with a slight gray coating on the tongue. Three grains of calomel and a half grain of opium were given three times. The record concludes on the 21st, the patient still perspiring at night and having the umbilical region tender.

Case 84.—*Death, probably from perforation of the intestine, on the 28th day.*—Sergeant David Puckett, Co. E, 5th U. S. Cav.; age 27; was admitted Oct. 18, 1861, having been sick since the beginning of the month with headache and pain in the limbs, back and epigastrium. A cathartic, to be followed by quinine, was prescribed. On the day after admission the patient was wakeful, his eyes dull and yellow-tinged, cheeks flushed, pulse 110, full and strong, skin hot, tongue slightly moist, red at the tip and edges but heavily coated yellowish-white in the centre; he had anorexia, thirst, three passages from the bowels during the twenty-four hours, much umbilical tenderness and tympanites, a slight cough and difficult micturition. Sinapisms were applied to the abdomen and emulsion of turpentine given every three hours, with extract of buchu as required. On the 20th the pulse fell to 90, but the condition of the patient was otherwise unchanged. A powder containing three grains of calomel, one grain of opium and one-eighth of a grain of tartar emetic was given every three hours. Next day the tongue became dry; seven stools were passed and the hypogastric and iliac regions were highly tympanitic and tender. On the 22d the diarrhœa continued, eight

stools having been passed; cerebral symptoms were manifested, as headache, hebetude, dizziness and tinnitus; the stomach became irritable and the tongue dry, red at the tip and edges and brown in the centre. On the 23d no change was recorded except the passage of urine without pain for the first time in several days. Lead, opium and tannin with tincture of iron were prescribed. On the 24th the patient was dull, lying with his eyes half closed in a semi-delirious condition; no stool was passed, but there was much vomiting. Two grains of calomel and a half grain of opium were ordered for administration every hour. On the 26th, having slept well at night, the patient was brighter, his mind less obtuse, and there was less abdominal tenderness; but the tongue was heavily coated yellow and the anorexia, thirst and vomiting persisted. Next day five grains of calomel and a quarter of a grain of sulphate of morphia were given, but no marked change was apparent until the 27th, when the patient was partly unconscious and delirious, lying with his eyes rolled up and mouth open, his breathing hurried, pulse 125, tongue dry and coated brown and stomach rejecting everything; there was extreme tenderness of the abdomen and much meteorism. Stimulants were administered by enemata. Death took place on the morning of the 28th.

Case 85.—*Remittent fever; symptoms of typhoid fever not distinctly manifested; fatal by peritonitis on the 25th day.*—Private Mason Hitchcock, Co. A, 19th Ind. Vols.; age 33; had a chill Aug. 28, 1861, with pain in the bones, back and calves of the legs, relaxation and tenderness of the bowels, and fever which was worse in the evening. He was admitted on the morning of September 5, when his pulse was 80, skin warm and moist, tongue pale and coated and colon tender on pressure. Quinine was given. He had a chill at 2 P. M., and in the evening the skin was hot and dry and the tongue very red, flabby and coated. On the 6th, 7th and 8th he had no fever at the morning visit; but in the evening the skin was hot and dry and the bowels somewhat relaxed and tender; his complexion was sallow and his mind rather dull. He was treated with Dover's powder and small doses of blue-pill. After the 9th there was slight fever at the morning visit, but the patient was able to be up and walk around a little until the 12th; the tongue was dry, brown, yellow and white by turns, but usually red at the tip; the pulse was weak, 80 when lying, 100 when standing; the bowels were moved from one to three times daily, and there was always some tenderness along the track of the colon. On the 15th two bloody stools were passed and the patient was much depressed, the colon tender, the tongue thickly coated yellow, the skin hot and sweating, pulse 86. A blister was applied over the colon and opium and tannin prescribed. The bowels remained quiet until the 17th, when an enema of soap was administered. At this time there was some tenderness in the right iliac region. On the 18th the stomach was irritable and the pulse ran up to 120. Vomiting continued next day and was accompanied with acute tenderness in the epigastrium; the patient lay on his back with his legs drawn up. On the 21st the pulse was 140, tongue nearly clean but very dry, skin hot, abdomen tender. In the evening the body became covered with a profuse sweat, the extremities cold, the features pinched, the pulse imperceptible, the heart's action irregular, speedily ending in stupor and death. No rose-colored spots were discovered in this case although specially looked for.

Case 86.—*Defervescence on the 22d day checked by chest complications; return to duty delayed to 80th day by diarrhœal sequelæ.*—Bugler Henry L. Case, Co. H, 4th Mich.; age 22; was admitted Sept. 6, 1861. Diagnosis—typhoid fever. This patient had good health up to August 26, when he was taken with pain in the head and bones, chills and fever, somnolence, great thirst and epistaxis. His case was not taken up in detail until the 13th, when the morning record shows him to have rested well during the preceding night; he was very weak but had some appetite, regular bowels, a thickly coated brown tongue, a pulse beating 98 per minute and a slight cough: the evening record shows a white tongue, bad taste in the mouth, some fever, bowels regular, abdomen tender and slightly tympanitic, cough, tinnitus aurium and muscæ volitantes. On the 14th anorexia was added to the symptoms already stated. Next day he became dull, complained of heaviness over the eyes, and in the evening seemed drowsy. On the evening of the 16th the tongue became moist and white, but this was not followed by any general improvement; on the contrary, on the evening of the 17th the fever increased with slight nausea, the pulse running up to 106, while next day a pain on deep inspiration was developed. But on the 19th the pulse again fell to 92 and the skin became moist and sweating. There was some tenderness in the epigastrium on the 20th, in the hypochondrium on the 22d and in the right iliac region on the 23d, in addition to the abdominal tenderness which had existed from the time of admission. On the 21st the patient became somewhat deaf in the left ear, and next day his eyes became dull. The abdominal tenderness was relieved on the 24th, when, also, the tongue began to clean in patches, but thirst continued until the 27th. The patient slept badly on the night of the 24th, the only night which furnished such a record, for usually he rested well, and next morning his pulse was 96 and he had a soreness in the chest. On the 26th the tongue was moist and only slightly coated, which improvement was followed next day by a brightening of the eyes, abatement of the thirst and a return of the appetite. The bowels, which to this time had remained quiet rather than lax, now became loose, giving two, three or four stools daily, with iliac tenderness and a yellow fur upon the tongue; but in progress of time this diarrhœa abated and on November 1 the patient was transferred to Annapolis, Md., whence he was returned to duty on the 13th. He was treated at first with Dover's powder and sweet spirit of nitre, and afterwards, on the 23d, with turpentine emulsion and iron, opium, acetate of lead and tannin.

Case 87.—*Headache, dizziness, deafness, delirium and muscular twitchings; relaxation, tenderness and tympanites of the bowels; pneumonia; no rose-colored spots.*—Private Sidney D. Way, Co. I, 2d Vt.; age 18; was admitted Sept. 27, 1861, having been taken three weeks before with intermittent fever, cough and pain in the breast. The case was diagnosed typhoid fever. The patient was weak, his cheeks flushed, countenance anxious, pulse quick, 120, skin hot and dry; he had some pain in the head and chest, with deafness and muscular twitchings; there was anorexia with a moist white tongue, and relaxed bowels with much tympanites and general abdominal tenderness. Small doses of blue-pill and opium were given on the 28th and turpentine emulsion on the 29th. During the next four days his condition was but little altered; the deafness increased, and delirium, dizziness and aphonia were manifested; three or four passages from the bowels were recorded every twelve hours; the cough occasionally became

troublesome, and was accompanied with a mucous expectoration; the respirations were at one time as high as 36 per minute. On the morning of October 2 the patient, having slept well during the previous night, was found with the skin of natural temperature and bathed in perspiration, sudamina on the right side and over the abdomen, the tongue moist and slightly coated yellow, and the pulse 95 but strong and quick; two stools had been passed during the night and a little blood expectorated, after which the cough became less troublesome; respiration 28, with much crepitation anteriorly on the left side and a little on the right side. Next day, however, the pulse was again accelerated, 113, and the skin hot and more or less dry, the other symptoms continuing as already described until the 6th, when with a freely perspiring skin the pulse fell to 90, and the patient had less cough and some improvement in the voice. After this the pulse again rose to 105, the skin becoming hot and dry, but the tongue remaining moist and yellow-coated; the cough and expectoration of mucus and blood continued, with dulness over the lower lobe of the right lung posteriorly and mucous and submucous râles above, and with crepitation over the left lung posteriorly; the diarrhœa and abdominal tenderness continued as already reported. By the 11th the pulse had risen to 118, and the patient was quite deaf and complained of headache. On the 12th the tongue, still continuing moist and yellow-coated, became red at the tip and edges; some sordes formed upon the lips, and tormina accompanied the diarrhœal passages. From this time to the end of the month the condition varied little from day to day, but a gradual alleviation of the symptoms of the lung and bowel complaints was observed. A free perspiration which occurred on the 20th was followed by a reduction of the pulse on the 21st and the manifestation of some appetite. The abdominal tenderness became lessened and the passages less frequent until the 31st, when, for the first time, the daily record shows that no stool was passed during the previous twenty-four hours. On November 1 the pulse was 80 and feeble, the skin natural, the tongue pale, the appetite good; the cough was less troublesome and there had been but one stool. His condition had not changed materially on the 9th, when he was discharged from the service on account of debility; the cough persisted with occasional relaxation of the bowels and abdominal tenderness, but with a good appetite and natural skin.

Case 88.—*Diarrhœa; bilious vomiting; perspirations; no rose-colored spots; dizziness; pulmonary complications on the 15th day; improvement on 28th.*—Private Dwight Tousely, Co. E, 3d Mich. Vols.; age 30; was admitted Oct. 19, 1861. Diagnosis—typhoid fever. On the 12th, after undergoing much fatigue, he was taken with headache, weakness and slight diarrhœa. He slept well after admission, and on the morning of the 20th his countenance was natural, pulse 88 and strong, skin perspiring, tongue moist, pale-red at the tip and edges and brownish in the centre; he had some appetite, slight thirst, two thin watery stools, some right iliac tenderness, borborygmus and slight tympanites. Quinine administered in a full dose at noon was vomited along with much phlegm and greenish-watery liquid. On the evening of the 21st he again vomited a greenish mass mixed with the rejected ingesta; he had dizziness and tinnitus aurium. The tongue on the 23d was covered with white scales; on the following day it was raw, red in the centre, pale and slightly coated at the sides; it became scaly again on the 25th, and the pulse rose to 94. On the 26th the pulse was 120 and feeble, the patient delirious, his countenance haggard and anxious, skin warm, moist and at times sweating profusely, tongue moist and cleaning from the tip and edges; he had no pain, but there was much tympanites, which was relieved by an enema; râles and creaking sounds were heard in the upper part of the chest, and the respirations were increased to 25. The pulse fell to 96 on the 27th, and on the 28th the patient appeared somewhat better; his mouth and fauces were covered with aphthæ. He had a chill on the afternoon of the 29th, and on the 30th was very nervous, although the tongue was cleaning, appetite good, bowels quiet and respiration normal. His condition did not improve materially until November 8, the tongue being occasionally dry and brown or moist and cleaning, the skin husky and the pulse accelerated. After that date, however, he slept well, had a good appetite, no thirst, soft skin and quiet bowels; some tenderness remained in the right iliac region; he had sore throat, but no cough, and his respiration was normal. He was transferred to Annapolis, Md., on the 18th.

Case 89.—*Date of onset not defined; persisting diarrhœa and vomiting of bilious matter; rose-colored spots; sordes; muttering delirium; involuntary passages; cold perspirations; death on 16th day after admission.*—Private Charles Green, Co. C, 1st Long Island; age 18; was admitted Sept. 14, 1861, having been suffering for some time from weakness, pain in the bones, heat of skin, thirst and diarrhœa. On admission his stomach was irritable. He rested well during the night, and next day, although he had a brown and thickly coated tongue and a bad taste in his mouth, his appetite was good, pulse 92 and skin hot and moist. Dover's powder was given. The tongue became dry and red at the tip on the 16th; the bowels were moved six times and were tender; the pulse rose to 108 and there was some deafness. He muttered continually during sleep on the 17th; the diarrhœa and irritability of stomach continued. In the evening rose-colored spots appeared on the chest and abdomen and sordes on the teeth; the lips were livid, and a peculiar odor emanated from the body. The muttering during sleep increased, and on the evening of the 18th the patient was delirious on awaking; nausea returned and he vomited twice. During the night he vomited five times a thin greenish-yellow matter of a highly offensive odor. Mild delirium continued during the 19th, and the urine was passed involuntarily; the matter vomited became of a lighter color; the diarrhœa persisted notwithstanding the administration of astringents, and there was intestinal gurgling with umbilical tenderness. Calomel in one-grain doses was given. Next day the gastric irritability was quieted and the diarrhœa lessened. In the evening he was restless and wakeful, his skin hot and dry, but his face covered with a cold perspiration, pulse 120, weak and tremulous; he had subsultus tendinum and passed one stool involuntarily. A similar stool was passed on the 21st, during which the prostration increased. The right iliac region is noted as having been tender on this day. He died on the 22d.

Case 90.—*Diarrhœa; delirium; sordes; pneumonic complication; eruption; slightly marked improvement on 15th day, after which free perspirations alternated with diarrhœa; vibices; epistaxis; peritonitis; death on the 31st day.*—Teamster

Jas. H. Perkins, quartermaster's department; age 23; a Virginian; was admitted Sept. 30, 1861. Diagnosis—typhoid fever. He had been taken with diarrhœa on the 25th and with head-pain and rheumatism on the 27th. On admission his face was flushed, eyes bright, pulse 96, quick and strong, tongue moist and slightly coated white; his bowels had been opened three times during the previous twenty-four hours, and the iliac regions were tender and tympanitic; he had also some cough. Calomel, opium and tartar emetic were prescribed. On October 1 the bowels were quiet, but there was some pain in the chest when coughing, with dulness over the lower lobes of the lungs. Small doses of calomel and quinine were given. He had three stools on the 2d. Next day the pulse ran up to 112, and complaint was made of headache and backache. Tincture of iron and camphor with opium were prescribed. He vomited twice on the 4th. His skin became moist on the 5th, and on the following day was covered with a profuse perspiration; but there was some delirium and much twitching of the tendons. On the 6th emulsion of turpentine was administered. On the 7th the pulse was 105, quick and strong, the skin natural, the tongue moist and heavily coated yellow; four stools were passed; the transverse and descending portions of the colon were tympanitic and the umbilical region tender; he had some cough, with slight pain in the right side below the nipple, and there was dulness on percussion over the lower lobes of both lungs, especially marked on the right side. On the 8th the skin was hot and dry and the bowels loose. On the 9th the patient was wakeful at night and dull and stupid during the day; the pulse 120, quick and strong; the skin hot and dry, showing some eruption (the character of which is not stated); the tongue red, fissured at the edges and coated dark-brown in the centre; the teeth and lips covered with sordes; he had, moreover, deafness, delirium, anorexia and diarrhœa. He continued in this condition until the 15th, when the tongue became moist, yellowish at the centre and red at the tip and edges, and the delirium and deafness were somewhat less marked; the pulse had fallen to 100. The skin was bathed in perspiration on the 16th and 17th, and this condition recurred on the 19th, 21st, 23d and 25th. Three or four stools were passed on the alternate days when the skin was hot and dry, but on the days when the skin was moist the bowels remained quiet except on the 21st, when they were moved six times. On the 19th vibices appeared on the skin and on the 23d became very numerous. On the 21st the pulse rose again to 120, and there was epistaxis with low delirium and increased deafness. The epistaxis recurred on the 22d. The patient became almost pulseless on the 25th; his skin was bathed in perspiration, and there was acute pain in the abdomen. He died on this day.

Case 91.—*Relapse of typhoid; fever, perspiration, delirium, diarrhœa and tenderness; rose-rash; death three days after the occurrence of what was regarded as a congestive chill.*—See case of Private James Beckwith, Co. F, 2d Me., No. 16 of the *post-mortem* records.

Case 92.—*Chills, diarrhœa and tenderness; nausea and vomiting; epistaxis and hemorrhagic stools; deafness; temporary improvement; death from parotid inflammation and gangrenous erysipelas.*—See case of Private James M. Forman, Co. H, 33d Pa., No. 103 of the *post-mortem* records.

Case 93.—*Chill and perspiration; diarrhœa, tenderness, rose-rash and mental confusion; temporary improvement followed by inflammation of the larynx and lungs, hemorrhagic stools and death.*—See case of Private D. F. McLachlan, Co. G, 14th N. Y., No. 110 of the *post-mortem* records.

Eleven Typhoid Fever Cases in which Aguish Paroxysms preceded the development of the Continued Fever.

Case 94.—*Intermittent fever; relaxation of the bowels and abdominal tenderness; no cerebral nor special typhoid symptoms, but no particulars are given of the patient's condition for some days preceding death.*—Private Andrew Landon, Co. C, 74th N. Y. Vols.; age 18; was admitted Nov. 2, 1861. Diagnosis—typhoid fever. His health had been good until about a month before admission, when he contracted intermittent fever. On the 3d his eyes were bright, cheeks flushed, pulse 100, quick and small, skin hot and dry, tongue faintly yellow; he had some appetite, some thirst, two stools and slight epigastric tenderness. On the 5th a blister was applied on account of increasing tenderness with some tympanites in the umbilical and iliac regions. At this time he was taking twelve grains of quinine daily with tincture of iron. On the 8th he was wakeful, the pulse rose to 120, the skin continued hot and the tongue coated; the tenderness had decreased, but the bowels were slightly relaxed and there was some cough. Emulsion of turpentine and beef-essence were prescribed. On the 10th there was much tympanites and three stools were passed. Whiskey-punch and astringents were ordered. On the 11th the eyes were bright, face pale, pulse 120 and quick, skin hot and dry, tongue dry and red but slightly yellow in the centre, appetite good. Acetate of lead and tannin were prescribed, but death took place on the 17th.

Case 95.—*Chills, fever and perspirations; eruption on 18th day; relaxation of bowels; iliac and epigastric tenderness; delirium; death on 35th day.*—Private John Dietrich, Co. B, 35th Pa. Vols.; age 19; was admitted Nov. 5, 1861. Diagnosis—typhoid fever. He had been healthy till Oct. 20, when he was taken with chills, fever, perspirations, pain in the head, back and limbs, lassitude, anorexia, thirst, vomiting, diarrhœa and cough with expectoration. On the 6th he was wakeful, eyes suffused, cheeks flushed, pulse 120, quick and bounding, skin hot, perspiring and covered with eruption and sudamina on the chest and abdomen, tongue moist and white-coated, bowels slightly relaxed, tympanitic and tender in the iliac and epigastric regions; he had some appetite, much thirst, slight cough and somewhat accelerated respiration. Quinine and tincture of iron were prescribed, with sinapisms to the abdomen. On the 7th the tenderness and tympanites were lessened. The mustard was repeated and Dover's powder given at night. He had some headache on the 8th and became delirious on the 10th. Here the record closes abruptly with the announcement of death on the 23d. Turpentine emulsion was administered on the 8th.

Case 96.—*Cerebral symptoms strongly marked; intestinal and pulmonary symptoms obscured; death on 19th day.*—Corporal S. H. Forsyth, Co. A, 3d Pa. Cav.; age 33; was taken sick Sept. 7, 1861, with chills, nausea and vomiting,

which recurred for three days. He was admitted on the 14th. Diagnosis—typhoid fever. He had pain in the head and bones, increased heat of skin, tinnitus aurium, dulness of intellect and occasional epistaxis. A bath was ordered for him and Dover's powder at night. He rested well, his bowels remaining quiet although somewhat swollen and tender: the tongue was brown and dry. Turpentine emulsion was given every two hours. On the 16th the pulse was 106 and strong, tongue brown, bowels regular but tympanitic, skin hot and dry, showing some rose-colored spots; there was anorexia and occasional epistaxis. He was restless during the night, and on the 17th became somewhat delirious, dull and drowsy; the pulse was 106 but weaker: the bowels regular but distended. A few rose-colored spots appeared on the 18th, and one dark-colored stool was passed. The tongue was tremulous and protruded with difficulty on the 19th, and the teeth were black with sordes. In the evening the tongue was dry, red at the tip and edges and black in the centre and at the base. Beef-essence and whiskey-punch were prescribed. On the 20th the eyes were suffused, pupils contracted, pulse 116, skin hot and dry but soft, teeth and lips covered with sordes, breathing labored, bowels quiet but tympanitic and gurgling on pressure. In the evening the pulse had risen to 126; a slight perspiration bedewed the forehead and arms and a few rose-colored spots appeared on the chest and abdomen; the delirium was accompanied by some deafness and muscular twitchings, but the respiration had become quiet and natural. Two days were passed without material change, but on the 23d the respiration became increased to 35: the skin was moist and hot, hands cold and clammy, pulse 136, small and tremulous, bowels quiet but largely meteorized, urine passed involuntarily. Tincture of capsicum was given and a blister and bandage applied to the abdomen. On the 24th the pulse reached 144 and was very feeble; the face was covered with sweat, the hands cold and damp, the feet warm; the patient was somewhat conscious but very deaf, and he had some difficulty in swallowing. A tube was passed to relieve the tympanites. On the 25th he was unconscious, muttering in his delirium, pulse 148, features pinched, forehead flushed, nose and lips blanched, eyes sunken and injected, cornea dull and partly glazed, extremities pulseless, heart's action feeble, skin of body warm and bedewed with perspiration, hands shrunken, damp and cold, tongue dry, brown and badly fissured, lips and teeth covered with dark-brown sordes; he was very deaf, had violent subsultus, dysphagia, involuntary urination and excessive tympanites, but no movement of the bowels; respiration was slow and labored. He died on this day.

Case 97.—*Preceded by quotidian chills; date of onset undefined; diarrhœal affection severe; delirium; prostration; death.*—Private Jacob Benson, Co. B, 1st Pa. Cav.; age 23; suffered with quotidian chills during August, 1861, and on September 7 was admitted. Diagnosis—typhoid fever. The patient was weak, dull and stupid: pulse 104, skin hot and dry, tongue dry, brown and heavily coated, bowels relaxed and painful. Whiskey and beef-essence were administered. Six thin stools were passed during the next twenty-four hours; the right iliac region was tender. Turpentine emulsion, Hoffmann's anodyne and morphine were prescribed. On the 9th delirium, epistaxis, rose-colored spots and three thin dark stools were noted, and on the 10th sordes, subsultus, difficulty in protruding the tongue and aggravation of the diarrhœa. Enemata of starch and laudanum were used, but the diarrhœa persisted, giving five or six stools daily until the end. A profuse eruption of rose-colored spots and sudamina appeared on the 14th. The stools were passed involuntarily on the 16th, and afterwards the abdomen was tympanitic and tender in the right iliac region. Carbonate of ammonia was prescribed on the 17th. Next day the stomach was irritable, the respiration labored, skin congested, eyes dull, half opened and with contracted pupils. On the 19th a few rose-colored spots appeared; the pulse was 120, soft and compressible, and the features shrunken. Death took place on the 20th.

Case 98.—*Chills and fever with, subsequently, the gradual accession of symptoms of enteric fever; diarrhœal attack on 17th day; rose-spots and delirium on 18th; inflammation of parotid on 24th; aggravation of diarrhœa on 28th and death on 30th day.*—Private James Roe, Co. F, 1st Mich.; age 22; was admitted Sept. 28, 1861, having been taken sick about a week before with chills and fever, for which quinine and alteratives had been administered. On admission he was weak, had anorexia and headache, but his skin was natural, tongue moist and slightly coated, pulse 72 and bowels quiet. Up to October 5 there was no marked change in the patient's condition; the coating of the tongue became somewhat thickened; the skin was dry, hot on the 3d, perspiring on the 4th; the bowels were quiet or moved once daily, and there was some tenderness in the right iliac region; the headache continued and there was slight cough. On the 6th the patient vomited some dark-colored matters. On the 7th he was restless for the first time since admission; the bowels were moved four times and the tongue was moist, red at the tip and edges and dark-brown at the centre and base. On the 8th he was delirious; pulse 90 and quick; skin hot and dry, showing a few rose-spots, disappearing on pressure, and mingled with profuse eruption (character not stated); tongue dry, flabby, red at the tip and edges, coated brown in the centre; appetite very good; he had one stool, some tympanites and slight gurgling in the right iliac region. No change was manifested save increasing dulness of mind and prostration until the 13th, when the tongue became slightly moist and the delirium lessened. During this period the teeth were covered with sordes and the mouth filled with tenacious mucus. On the 14th the parotids became swollen. Next day the pulse was 120 and feeble and the bowels quiet but tender and distended; the patient, nevertheless, when aroused from his low delirium, expressed himself as feeling quite well. The tongue became moist and its coating yellowish-white on the 16th, and on the following day the patient was more rational; the eruption was present up to this date. A sharp diarrhœa of seven stools occurred on the 18th and the pulse reached 140. A blister was applied to the abdomen. On the 19th vibices appeared: the tongue could not be protruded on account of the parotid swelling; the bowels were moved once only, but they were generally tender and much meteorized. Death took place on the 20th.

Case 99.—*Typhoid fever following intermittent; intestinal symptoms not marked; death from pneumonic complications.*—Private A. W. Armagust, Co. I, 33d Pa. Vols., was admitted Oct. 2, 1861. Diagnosis—typhoid fever. About September 28 he had been taken with headache and chills, which recurred every night. He felt well on the morn-

ing after admission, but in the evening the pulse became accelerated and strong, the skin hot and dry and the tongue red, clean at the tip but coated at the base; he had three stools during the day, with some soreness of the abdomen, but no tympanites nor gurgling. Quinine was given. He is reported as having slept well on the 4th and as having had no chill on the 5th; on the 6th his condition is not stated. On the 7th he had headache and was restless; countenance natural; pulse 86, steady; skin hot and dry but soft; tongue moist, red and quite clean; he had pain in the bones, two stools and abdominal tenderness, but no tympanites. He had one stool on the 8th. Small doses of calomel, quinine and opium were given. The headache was worse on the 9th; there was a feeling of pressure on the brain with buzzing in the ears and deafness; four stools were passed; the tongue was dry, red at the tip, furred in the centre and coated gray at the base. Sweet spirit of nitre was prescribed. On the 10th the bowels were quiet and continued so to the end with but little complaint of abdominal tenderness or tympanites. Emulsion of turpentine and Mindererus' spirit were administered. On the 11th the skin was hot but moist; the tongue continued dry and the appetite did not return, although there was marked improvement in the cerebral and abdominal symptoms. On the 15th the patient was restless, and there was some cough for the first time in the progress of the case; the cough grew worse, and on the 17th brown mixture was prescribed. Next day there was anxiety of countenance and much cough, but neither accelerated respiration nor pain. On the 20th the patient was slightly delirious. Whiskey-punch and citrate of iron and quinine were given. On the 22d his face was pale, countenance dull, pulse 82, steady, surface circulation good, skin dry and husky but not hot, tongue slightly brown and dry in the centre, whitish and moist along the sides, red at the tip and edges, teeth and gums clean; he had some appetite, no thirst, and a cough with slight wheezing and gurgling sounds in the lower parts of the lungs; at times also he had some dizziness and tinnitus. On the 23d the respiration became increased to 26; the pulse to 102; the abdomen was soft and natural. He died on the 29th. No eruption was noticed in this case.

Case 100.—*Chills; pale, coated tongue and offensive breath; jaundice and epigastric pain; bowels quiet; cerebral symptoms not marked; record unfinished.*—Private George H. Peters, Co. F, 4th Mich. Vols.; age 21; of weakly constitution, was admitted Nov. 1, 1861, as a case of typhoid fever. On October 23 he was taken with headache and chills which lasted for three days, and with anorexia, weakness, diarrhœa, cold feet, tinnitus aurium and fever, for which Epsom salt and quinine had been administered. On admission he was dull and unable to collect his thoughts on account of a fulness in the head and ringing in the ears; his pulse was 98 and strong, skin warm and soft, left cheek flushed darkly, tongue dry and moist by turns, pale, clean at the tip and thickly coated whitish-gray at the base; he had no appetite but much thirst, acute epigastric and right iliac tenderness, tympanites, but no diarrhœa; respiration was normal, but the breath was very offensive; there was also some pain in urinating. Brandy-punch and beef-essence were given with quinine, calomel and opium three times daily. A few rose-colored spots appeared next day. On the 4th the skin was dry, warm and somewhat jaundiced; the tongue red at the tip and edges, pale and coated white in the centre and at the base, the bowels meanwhile remaining tympanitic and tender but unmoved. He slept well during the night, and on the 5th his mind was clear and eyes intelligent, skin dry, tongue moist, pale and slightly coated in the centre, breath free from all offensive odor. On the 6th a few more rose-colored spots appeared, but the bowels remained quiet, and the slight tenderness present was in the epigastric region; the abdomen was soft. He had two stools on the 7th. Turpentine was administered. On the 8th the skin was warm and soft and presented a few dark-red spots which were imperceptible to the touch and disappeared on pressure; pulse 56, small and compressible; tongue moist and thickly coated in the centre. At this time he did not sleep well and his appetite continued poor. Here the record leaves him, concluding with a statement of his transfer to Annapolis, Md., on the 18th.

Case 101.—*Recurring chills; cerebral symptoms slightly marked; gastric irritability; diarrhœa and abdominal tenderness.*—Private Frederick Doser, Co. B, 24th N. Y. Vols.; age 24; had been troubled with liver complaint since 1856, and about Sept. 16, 1861, was taken with intermittent fever, which persisted notwithstanding the use of quinine and opium. He was admitted on the 30th as a case of typhoid fever. His eyes were dull, pulse 96, skin natural, tongue moist but furred white; he had pain in the bones and anorexia, cough and pain in the chest, three stools daily with tympanites, iliac tenderness and some gurgling. Opium, antimony and blue-mass in small doses were given every three hours. Next day the pulse was 112, skin somewhat hot, eyes injected and suffused, tongue moist, furred in the centre and red at the edges, bowels much meteorized and tender at the umbilicus. Quinine was given with turpentine emulsion in place of the mercurial. The quinine was continued on the 2d and tincture of iron ordered on the 3d, the pulse having meanwhile fallen to 85, the tongue become cleaner and the appetite improved. A diarrhœa of four stools daily set in on the 4th, followed on the 5th by epigastric pain, intestinal gurgling, tenderness in the right iliac region and in the course of the transverse colon, and on the 6th by loss of appetite and irritability of the stomach. Seven stools were passed on the 9th and three on the 10th, after which the attack gradually declined; during this time there was some head-pain with dizziness and tinnitus aurium, and the tongue remaining red at the tip and edges became covered elsewhere with yellowish patches. Conjunctivitis, which appeared on the 11th, was treated with a zinc wash. On the 14th the pulse was 56 and regular, the skin natural, the tongue moist and clean and the appetite good. The patient was transferred to Annapolis, Md., November 1.

Case 102.—*Recurring chills and diarrhœa; perspirations; nothing but rose-spots on the 13th day as specially characteristic of typhoid fever.*—Private A. Stoughton, Co. C, 5th Vt. Vols.; age 18; was admitted Nov. 1, 1861, as a case of typhoid fever. On October 23 the patient had chills which recurred for several days, fever, general pains, weakness, anorexia and diarrhœa. On November 2 his eyes were bright, countenance calm, pulse 88 and of fair strength, skin warm and perspiring, tongue clean at tip, moist and slightly coated at the base and in the centre, lips and teeth clean, appetite fair, abdomen soft and respiration normal; one stool was passed in the twenty-four hours. A full dose of quinine was given three times daily. On the 3d he was reported as having slept well; pulse 84, appetite

good, skin normal, tongue cleaning; two stools were passed. On the following day, without any other change in the symptoms, rose-colored spots appeared on the chest and abdomen; he had one stool on this day, and after this his bowels were reported as regular. He was returned to duty on the 11th.

Case 203.—*Shivering chills; intestinal trouble; mental delusion; rose-spots on 14th day, immediately followed by convalescence.*—Private Samuel Bissonette, Co. A, 4th Mich.; age 22; was seized about Sept. 5, 1861, with daily chills accompanied by headache, pain in the back and legs, anorexia and restlessness. He was admitted on the 16th. Diagnosis—typhoid fever. In the evening the patient was weak and had no appetite; the pulse was 80; skin hot and moist; tongue coated white, but red at the tip and edges; one stool was passed; the right iliac region was tender, and complained was made of pain in the back and legs. Ten grains of calomel and jalap were given. Eight dejections occurred during the night and next morning the skin and eyes were jaundiced. Quinine was given. In the evening the pulse was 76, the skin warm and moist, the tongue coated great but red at the tip, the bowels quiet; there was some right iliac tenderness and normal fullness with tympanites present. Next day the bowels remained quiet and the tenderness ceased; but pain in the head and in the back was noted. The abdominal tenderness returned on the 20th; pulse, also, the tongue was nearly clean but dry, the cheeks flushed and the pain in the back so acute as to require anodynes. The bowels were quiet on the 21st and without pain or tympanites; the tongue coated gray; the skin moist. Two stools were passed on the 21st; the tongue was white, the skin hot and dry, and there was some thirst and cough, but the appetite was good. A few rose-spots appeared on the 22d, the tongue being pale and moist, the pulse 80. In the evening of the 24th he was ill; pulse 96. He perspired during the night, and next day the skin was warm and moist, the tongue pale and clean and there was no tenderness, tympanites nor symptoms. A few more spots were found next day on the abdomen and chest. After this improvement was steady. The patient was walking about on the 29th, and was transferred to Annapolis, Md., October 1.

Case 204.—*Shivering chills and fever; diarrhœa; slight delirium; great prostration; vibices and gangrene of blistered surfaces; death.*—See case of Private Daniel Plummer, Co. H, 5th Pa., No. 76 of the *post-mortem* records.

Eight Typhoid Fever Cases preceded or accompanied by Remittent Fever.

Case 187.—*Several years in field. The preceding malarial attack appears to have ended on October 7, when the pulse had fallen to 80 and the skin and tongue were in natural condition, leaving the patient, however, with a tendency suggesting a congested and perhaps ulcerated condition of the bowels, and some pulmonary engouement. The typhoid fever is announced by prominent symptoms; its endurance, after rising to the appearance of the rose-colored spots, seems only to have prolonged the period needful to a return to health. It is noticeable that on October 16, while the rose-spots were yet fading, the patient was permitted to be out on pass.*—Corporal Christopher Bensinger, Co. D, 7th Mich.; age 20; had been liable to attacks of intermittent fever since 1858. He was admitted Sept. 28, 1861, as a case of typhoid fever. He had been taken sick three days before with chills, fever and pain in the back, and had taken quinine; face flushed, eyes dull, lids dropped; pulse 104, small, easily compressed; skin moist, slightly above natural temperature; tongue moist, slightly coated white; anorexia and irritability of stomach manifested by spontaneous efforts at vomiting; tenderness over entire abdomen, slight tympanites in right iliac region, no stool; dull, heavy head-pain; soreness to pressure of muscles; no cough but respiration hurried, 28 per minute. During the examination a violent chill came on; the extremities became cold, the pulse small and at times imperceptible at the wrist, the cheeks cold, the breathing hurried and interrupted, the eyes turned upward; some stupor was also noted. Quinine, opium and calomel were ordered to be given every four hours. 29th. *morning:* Slept some; face congested; eyes suffused; pulse 120, quick, feeble; some pain in head and limbs; some deafness and stupor; skin of natural temperature; tongue dry, brown, moist at edges; anorexia; epigastric and general tenderness; tympanites; borborygmus of liver; no cough. Milk-punch, beef-essence and lime-water and opium were ordered. *Evening:* Feeling better; face flushed; eyes suffused; head dull and heavy; pulse 120, full and strong; skin moist; tongue moist at edges, brown and dry in centre; anorexia; slight tenderness in abdomen, particularly in right iliac region; some tympanites and borborygmus; no stool; no cough. Dover's powder was given. 30th. *morning:* Slept well; cheeks congested; eyes dull; head-pain; pulse 112, quick, small; skin hot and moist; tongue moist at edges, dry in the centre; anorexia; tympanites; slight tenderness in right iliac region, marked in left; much soreness in right hypochondriac region; two stools. Ordered three grains of calomel, one of opium and one-third of a grain of ipecacuanha every three hours. *Evening:* Drowsy; face congested; eyes dull; head-pain; pulse 112, strong, skin above the natural temperature, covered with perspiration; tongue slightly moist at tip and edges, dry and white in centre; four stools; slight tympanites; tenderness in left iliac region. Ordered astringents. 31st. *Morning:* Head-pain; pulse 112, quick, strong; skin moist, slightly above the natural temperature; tongue moist at edges, dry and white in centre; appetite small; several stools; some cough; pain in right lung; respiration 30. Ordered turpentine and astringents. *Evening:* Ordered one grain of opium and two grains of Dover's powder every three hours. 2d: Slept some; face congested; eyes dull; slight head-pain; pulse 105, quick and strong; skin hot and moist; tongue moist, coated white in patches in centre; some appetite; slight tenderness; no tympanites; paroxysms of coughing; mucous expectoration streaked with blood; respiratory murmur in lower lobes of right lung entirely lost. Veratrum viride and sweet spirit of nitre were ordered to be taken every hour. 3d: Slept some; head-pain and slight delirium; pulse 112, quick, strong; skin somewhat hot; tongue moist, clean but for a few yellowish patches in centre; some appetite; two stools; much cough; viscid mucous expectoration streaked with blood; respiration 30; respiratory murmur now heard past at right side; some dullness on percussion on left side. 4th. Slept but little; some head-pain; pulse 108, strong; skin hot; tongue moist, covered with yellowish patches in centre; vomiting; anorexia; three stools; some cough; mucous expectoration streaked with blood; respiration 28 but deeper; dullness decreased in left lung, increased in right. Fifteen drops of veratrum viride were given during the day. 5th. Slept well; pulse 96, full, skin soft but rather warm; tongue moist, slightly coated in

centre with yellowish patches; some appetite; three stools; but little expectoration; respiration 26. Milk-punch and Dover's powder were given. 6th: Slept well; head-pain; pulse 90, full; skin of natural temperature, covered slightly with perspiration; tongue moist, coated white in centre; appetite good; some tympanites; right iliac tenderness; two stools; slight cough and expectoration; respiration 25. 7th: Slept well; looking better; pulse 80, natural; skin and tongue natural; two stools; slight cough; respiration 25; respiratory murmur absent on left side below third rib. 8th: Not so well; countenance and skin natural; pulse 85, quick; tongue moist and clean; appetite good; three stools; some cough; slight expectoration of mucus slightly tinged with blood; respiration 35; some crepitation and absence of respiratory murmur on left side, lower portion; mucous râles in middle lobe of right lung, vesicular murmur in upper portion. 9th: Slept well; pulse 80, weak; skin natural; appetite improving; two stools; respiration 26. 10th: Restless; eyes more natural, cheeks less congested; pulse 80, quick; skin natural; tongue moist, clean; appetite moderate; cough slight; two stools. Tincture of iron ordered three times daily. 11th: Stronger; slept some; eyes bright; face slightly flushed; pulse 85, quick; skin natural; tongue moist, clean; appetite good; three stools; cough slight. 12th: Slept well; looking better; cheeks congested; pulse 90, strong, wiry; skin of natural temperature, an occasional rose-spot appearing; tongue moist, clean; slight tenderness in right iliac region; two stools; no cough. 13th: Slept well; looking bright; pulse 90, quick; skin a little above the natural temperature; slight pain in right lung; tongue moist and clean; appetite good; six stools; no cough. 14th: Slept well; looking bright; pulse 110, quick, corded; skin of natural temperature, an occasional rose-spot appearing; tongue slightly coated yellowish in centre; appetite moderate; three stools; moderate tenderness in right umbilical and left iliac regions. 15th: Slept some; pulse 80, regular, corded; skin of natural temperature, showing a few rose-spots, disappearing on pressure; tongue moist, coated yellowish-white in centre; appetite good; three stools; some umbilical tenderness; some pain in middle of right side on deep inspiration. 16th: Out on pass. 17th: Slept well; pulse 85, quick; skin of natural temperature; tongue moist, coated slightly white in centre; appetite moderate; two stools. 18th: Wakeful; pulse 86, somewhat irregular; skin covered with perspiration; slight headache; tongue moist, clean; appetite poor; two stools; some epigastric pain and tenderness. 19th: Slept well; pulse 62, regular; skin natural; tongue moist, clean; appetite moderate; three stools; pain on deep inspiration. 20th: Slept well; pulse 86, regular; skin and tongue natural; appetite good; two stools. 21st: Slept well; pulse 90, quick; skin and tongue natural; buzzing in ears; appetite good; two stools. 22d: Slept well; bright; pulse 90, somewhat quick; tongue clean; appetite good; two stools; some abdominal tenderness. 23d: Slept well; pulse 90, natural; still some pain in right side of chest. 24th: Wakeful; pulse 90, quick; skin moist; tongue white; appetite moderate; two stools; less tenderness. 25th: Slept well; pulse 90, quick; skin natural; tongue clean; appetite good; two stools; some general tenderness. 26th: Returned to duty.

Case 106.—*Remittent fever not amenable to treatment by quinine; record deficient, but typhoid fever suggested by diarrhœa, tenderness in the right iliac region, brown tongue and subsequent discharge for debility.*—Private James Ellison, Co. F, 19th Ind.; age 24. This man contracted tertian ague about Aug. 20, 1861. The chills were broken up by quinia. He was admitted September 4 as a case of typhoid fever. On the morning of the 5th the fever was slight, the pulse 72, skin natural, tongue flabby and coated yellowish-brown, appetite good, bowels somewhat relaxed and tender on pressure. Quinia was ordered. In the evening there was a moderate fever with flushed face, hurried respiration, hot and dry skin and a burning in the mouth and throat; the bowels were moved twice during the day. Dover's powder was given. He rested well during the night, and next morning was sweating and without fever; but in the evening the skin became hot and dry, the tongue pale, dry and slightly coated, and seven loose stools had been passed accompanied with umbilical pain. A similar remission and exacerbation occurred on the 7th, the dejections on this day being thin, small and lumpy. The remission on the morning of the 8th was not so well marked, although the bowels had not been disturbed during the night; the mind was clear. On the 9th, in the morning, the face was flushed, the pulse 68, the tongue pale, flabby and coated in the centre and at the back, the skin warm and dry; one thin stool had been passed without pain but with borborygmi. In the evening the pulse was 86, the skin warm and dry, the tongue pale and coated brown in the middle; there were no rose-spots; three thin small stools had been passed without pain; the appetite was improving. Dover's powder with small doses of blue-pill and citrate of iron and quinine were ordered. The 10th gave a similar record, but in the evening the tongue was dry and coated brownish, and in connection with four thin small stools passed during the day, it is stated that there was some right iliac tenderness. The blue-pill and iron were omitted and the Dover's powder and quinine continued. On the 11th an acetate of lead and opium pill was given three times, but the diarrhœa continued with slight fever in the evening, and a moist tongue, coated brown in the centre, up to the 13th, when he was transferred to hospital at Baltimore, Md. [He was discharged October 15 on account of general debility.]

Case 107.—*Recurring chills; diarrhœa; rose-colored spots; gastric irritability; improvement about end of 4th week.*—Private R. M. Robinson, Co. C, 9th Pa. Vols.; age 19; was admitted Sept. 19, 1861, with typhoid fever. About three weeks before his admission he had been taken with chills and pain in the head and bones; the former recurred at intervals of several days with fever at night and continued diarrhœa. On the evening of the 19th the patient was weak but looked well; pulse 78, eyes bright and clear, skin warm but dry and covered on the abdomen and chest with characteristic rose-spots, tongue dry, smooth, glossy and nearly clean; but he had pains in the head, back and limbs and in the hypogastric and right iliac regions, with distended bladder and dysuria. Castor oil, acetate of potash and sweet spirit of nitre were given. He slept badly and had epistaxis at night. Next day the pain in the back and limbs was severe; the skin was dry and warm, the tongue dry, cracked and yellowish-brown in color, the stomach slightly irritable, the bowels tender; one stool was passed. On the 23d a second crop of rose-colored spots appeared on the surface; the bowels were quiet and the tenderness much relieved. The tongue became clean on the 25th. On the 30th the patient was considered convalescent. He was transferred to Annapolis, Md., November 1 [and was returned to duty December 12].

CASE 108.—*Mild typhoid grafted on remittent fever.*—Private E. R. Lassey, Co. A, 4th Mich.; age 28; was seized with headache, weakness and nausea about Sept. 6, 1861, and on the 16th was admitted as a case of typhoid fever. In the evening the patient's face was flushed and he had [illegible] moist, tongue moist, yellowish and heavily coated, bowels quiet. Ten grains each of calomel and jalap were given; two dejections followed, and next morning the tongue was cleaner at the tip and edges. Quinine was ordered. In the evening there was no fever, the skin was cool, moist and perspiring; one stool was passed during the day, and there was tenderness in the right iliac region. On the morning of the 18th there was no fever, the skin being cool and moist, and the abdominal tenderness relieved; but in the evening the patient had one thin, large stool, and the right iliac region became acutely tender. Dover's powder was prescribed. On the 19th there was tympanites and the iliac region continued tender, but the skin remained cool and moist and the bowels quiet. The condition of the patient was changed on the 20th only by the diminution of the tympanites; one stool was passed during the day. On the 21st there was deafness with anxiety of expression; there was also some thirst, but the appetite was good and skin natural. The tongue was clean on the 22d, the pulse 68, small and soft, the skin natural, the bowels quiet and neither tender nor tympanitic, but the iliac region [illegible]. In the evening rose-spots made their appearance, and a second crop on the 24th. Wine and bark were ordered. He was reported as walking about on the 30th, and was transferred to Annapolis, Md., October 1.

CASE 109.—*Mild typhoid grafted on remittent fever.*—Private Eli Sulgrave, Co. D, 19th Ind.; age 18; had a chill about Aug. 25, 1861, and was admitted September 4. Diagnosis—typhoid fever. He had headache, pain in the bones and back, and slight diarrhœa with fever, which was aggravated daily about noon. On the morning of the 5th there was tinnitus aurium but no fever; the pulse was 76, skin [illegible], tongue coated, pale and flabby, appetite good, bowels regular. Quinine was ordered. In the evening the pulse was 72 and strong, tongue pale, flabby, red at the edges and white at the base and centre. During the day he had one soft stool and was weak and giddy. Dover's powder was given at night. Until the 11th the patient continued without change, a slight febrile action occurring every evening, manifesting itself in flushing of the face, but the pulse in no instance rose higher than 80; there was one stool daily, with, on one occasion, pain in the left iliac fossa. He usually rested well and had a fair appetite, although his tongue continued pale, flabby and coated. On the 11th a few rose-spots appeared, which faded next day, but were replaced by others and an eruption of sudamina; the pulse was 68, the skin cool, bowels quiet and not tender, tongue [illegible]. On the 13th he was sent to hospital at Baltimore, Md. [He was afterward transferred to the 20th Ind. and served until the close of the war.]

CASE 110.—*Mild typhoid grafted on remittent fever.*—Private E. S. Elmer, Co. K, 14th N. Y.; age 22; was admitted Sept. 24, 1861, having been taken sick three weeks before with diarrhœa followed by bilious remittent fever. On admission he had severe headache with flushed face, injected eyes and [illegible] pulse. [illegible] following night; in the morning he was covered with sweat, pulse 58, [illegible], tongue slightly [illegible], bowels moved once, respiration natural; his appetite was good, but he had [illegible]. Two grains of blue-mass and a half grain of quinine were ordered to be given every two hours. On the 26th he was not so well; his face was flushed, eyes [illegible] and [illegible]; the tongue was [illegible] and there was delirium; the tongue was heavily coated yellow and the appetite lost; there was also retention of urine, but the skin was moist and profusely covered with sudamina; [illegible] had been one stool, and the patient had no pain nor tenderness. Castor oil and extract of buchu were ordered. In the evening the skin was [illegible] bathed in perspiration, the pulse 96, strong, the tongue [illegible], the bowels [illegible] and slightly [illegible] urine. On the 27th the face was not flushed; the skin was soft and natural, the respiration normal, the tongue moist, yellow in the centre, and the appetite good; two stools were passed and there was some right iliac tenderness; a few rose-colored spots appeared on the abdomen. One drachm of turpentine emulsion was given every three hours, with twelve grains of quinine in the forenoon. In the evening the cheeks were flushed, the eyes suffused, the pulse 96, the skin dry and hot, the tongue moist and heavily coated [illegible]. One stool was passed and tympanites, borborygmus and tenderness were present. Sweet spirit of nitre and Dover's powder were given. No stool was passed on the 28th; the skin was natural, pulse 92, strong, the tongue moist and yellow, the appetite moderate; there was some difficulty in micturition but no abdominal pain nor tenderness. In the evening four or five rose-colored spots appeared on the abdomen and chest. Next day he was well but rather above the natural temperature, the tongue moist and yellow-coated but [illegible] and edges, [illegible] red spots on the abdomen, which was slightly tympanitic but [illegible]. He continued doing well during eight days and had three stools with some tympanites and left iliac tenderness. Lead, opium and tannic were given. Slight relaxation of the bowels continued up to October 10, when the patient was sent to hospital at Annapolis, Md.

CASE 111.—*Chill; remitting fever; slight diarrhœa; moist skin; flabby tongue; rose-spots on 15th day; drowsiness; perspirations; sordes; record imperfect; death.*—Private Henry Martindale, Co. F, 19th Ind. Vols.; age 24; was taken Aug. 28, 1861, with headache, pains in the bones, languor and chill. He took quinia and had no recurrence of the chill; but the fever which followed was general [illegible] the morning. He was admitted September 4. Diagnosis—typhoid fever. On the 5th: Pulse 76; skin warm and moist; tongue heavily coated, pale and flabby; slight diarrhœa; pain in the back. Quinine was given. *Evening:* Skin warm, [illegible]; tongue flabby and coated white; three thin small stools, but no pain or tenderness in the [illegible]; appetite fair. Dover's powder at night. On the 6th and 7th the symptoms were unchanged. On the 8th the mind was somewhat dull, the patient continued to lie up and to walk about occasionally. Sugar of lead and opium were given. No [illegible] change took place until the 15th, when the warm and moist skin showed sudamina and some rose-colored spots on the abdomen, the tongue at this time being pale, flabby and coated gray, the bowels [illegible] and the appetite good. Blanket [illegible]

prescribed. The patient was drowsy on the 12th, and on the following day the tongue became brown and cracked but remained pale at the tip, the skin hot and dry, the breathing hurried, and the bowels moved eight times but free from pain and distention. On the 14th the tongue was dry and the countenance haggard. Two grains of quinine and one of calomel were prescribed for administration three times daily. Profuse perspirations occurred on the 15th, but the diarrhœa continued and sordes appeared on the teeth. Turpentine emulsion was given. On the evening of the 16th there was some tenderness of the abdomen and the patient kept tossing his head from side to side. On the 18th the pulse was 80, weak and small, tongue heavily coated, brown in the middle and red at tip and edges, skin hot and moist, bowels not tender but quite loose, especially at night. On the 19th there was some tenderness in the right iliac region. Ten stools were passed on the 22d, and on the following day the abdomen was tympanitic. The record closes abruptly with the announcement of death on the 28th.

Case 112.—*Coincidence of remittent fever and typhoid.*—Arminius Tyler, attendant; age 21; was admitted Sept. 9, 1861, having been sick since the 1st with headache, pain in the back and fever, aggravated at night, but not preceded by a chill. On admission his face was flushed, pulse 79, tongue white and coated, skin warm and sweating; he had epistaxis and a few rose-colored spots on the abdomen. Next day the tongue was moist, brown-coated in the centre and red at the tip and edges; the bowels were quiet but tender on pressure. Quinine was taken during the day and Dover's powder at night. On the 11th the patient was dull and prostrated, pulse 68 and feeble; but in the evening there was much restlessness with high fever, pulse 90 and strong. Next morning a remission occurred, followed by an exacerbation in the evening; the tongue was pale, flabby and coated brown, and the bowels continued quiet. On the 13th the evening exacerbation was not so marked, but the tongue was heavily coated gray and the skin and conjunctivæ were jaundiced. Blue-mass was given in addition to the quinine. On the 15th two large stools were passed, and in the evening three free, thin and painless stools. Aromatic sulphuric acid was prescribed. On the 16th the pulse was 62, the tongue pale and heavily coated gray, the bowels quiet, the jaundice disappearing; there were rose-colored spots and a profusion of sudamina on the skin, which perspired freely. Rose-colored spots appeared again on the 18th; the bowels continued quiet and the evening accession became less manifest; night-sweats were profuse. On October 1 the patient had so far recovered as to be placed on light duty.

Eight Remittent Fever Cases with more or less evidence of the co-existence of Typhoid Fever.

Case 113.—*Diagnosis—remittent. Delirium, stupor, deafness; diarrhœa; rose-colored spots and bed-sores.*—Private Bennett Pepper, Co. H, 62d N. Y.; age 19; was taken sick early in February, 1862, with headache, nausea, vomiting and pains in the back and limbs, and was admitted on the 27th as a case of remittent fever. On March 5 he was delirious, drowsy and inclined to stupor; he had tinnitus aurium and twitching of the mouth, puffy eyelids, flushed cheeks, rapid and weak pulse, hot and dry skin, moist but much coated tongue, sordes on the teeth, some appetite, much thirst, a diarrhœa of four watery stools daily, which were sometimes passed involuntarily; respiration was hurried and there was some cough. Beef-essence, turpentine emulsion and tincture of opium were prescribed. On the 6th there was profuse perspiration with sudamina. Next day the delirium abated and the patient replied rationally but with difficulty; the tongue was coated but moist, and was permitted to remain protruded indefinitely; the bowels were regular but meteorized and tender and the abdomen showed some rose-colored spots; the breath was very offensive from ozæna. There was much tendency to stupor on the 9th, with occasional delirium. Free perspiration with sudamina occurred again on the 10th, and the urine was excessive in quantity; cough persisted and there was some dulness on percussion a little below the clavicle on the right side. The skin became hot and dry on the 12th and the watery stools returned; respiration was hurried and the breath very offensive. The mind became clear on the 14th, and on the following day the skin was natural, the tongue clean, the pulse good, but the bowels continued loose. The diarrhœa, however, subsided on the 16th, on the occurrence of copious sweating with sudamina, and the cough was much relieved; earache, developed on this day, was noted also on the 17th, when the skin again became hot and dry and the tongue somewhat coated. Some sore spots on the back and hips were observed on the 18th, and next day the patient was placed on a water-bed. He became deaf at this time, but his general condition improved, and on the 28th he was able to walk about. He was discharged April 26 because of general debility.

Case 114.—*Diagnosis—remittent fever. Diarrhœa and abdominal pain; deafness, delirium and prostration; record incomplete.*—Private Edwin White, Co. H, 86th N. Y. Vols.; age 18; was admitted March 2, 1862, with remitting fever, headache, giddiness, nausea and constipation. The record is silent as to his condition until the 13th, when he was dull and dejected and talked much in his sleep, having a hot and dry skin, a dry tongue, rough and coated but clean and moist at the edges, some pain in swallowing, diarrhœa, abdominal pain and slight iliac tenderness, with headache and flushed cheeks, rapid pulse and occasional epistaxis. The fever increased towards evening and was followed by a chill. From the 14th to the 18th he had delirium at night but was rational during the day; his bowels were slightly relaxed, the stools thin and watery, and there was much abdominal tenderness. Quinine was ordered on the 14th, tincture of iron and turpentine emulsion on the 15th; epistaxis was noted on the 16th and deafness on the 17th. On the 18th delirium gave place to dulness and stupidity, which increased until on the 21st the patient was unable to protrude his tongue well and swallowed with difficulty; there was epistaxis; cough became troublesome and the expectoration was tinged with blood, which was conceived to be owing to the epistaxis. From this time to the 30th, when the daily record ends, there was little change in the symptoms. The patient was discharged for debility May 10.

Case 115.—*Symptoms of typhoid in a case entered as remittent; discharged on account of rheumatism.*—Private L. Pettit, Co. D, 3d Mich. Vols.; age 22; of delicate constitution and liable to pulmonary troubles, was admitted Oct. 19, 1861, as a case of remittent fever. Next day his eyes were bright, cheeks slightly flushed, pulse 74 and

regular, skin somewhat above the natural temperature, tongue moist, fissured and faintly coated yellow, appetite good; he had a slight cough, pain in the back and limbs, relaxed bowels, tympanites and general abdominal tenderness, marked in the right iliac region. Two rose-colored spots were discovered on the 21st, the symptoms otherwise remaining as stated. Twelve grains of quinine and two of opium were given daily in divided doses, with Dover's powder at night. On the 24th the skin became moist. Next day he was wakeful, his eyes dull and cheeks congested. Two drachms of sulphate of magnesia with one-twelfth of a grain of tartar emetic were given in the morning and two compound cathartic pills at night. After this he seemed to improve, his pulse, tongue and skin becoming natural and appetite good. He slept well, and on the 29th was out of bed and dressed; but on this day his eyes were bright, cheeks somewhat flushed, pulse 80, and he had pain in the hip, knee and ankle-joints, which continued until his transfer, November 1, to Annapolis, Md. [Diagnosis—rheumatism; patient discharged from service on the 29th.]

Case 116.—*Diagnosis—remittent. Diarrhœa and rose-colored spots; no cerebral symptoms.*—Private Oscar H. Field, Co. C, 24th N. Y. Vols.; age 30; was taken Sept. 23, 1861, with intermittent fever, and admitted on the 30th as a case of remittent fever, presenting a quick strong pulse, 100, continuous headache, a red and slightly coated tongue and capricious appetite. Dover's powder was given. The patient vomited during the night; next day the tongue was dry, red at the edges and brown in the centre, and the teeth covered with sordes. Turpentine emulsion was given every two hours, with small doses of opium, ipecacuanha and nitre. On October 2 wine and cinchona were ordered in repeated doses; at night the patient perspired a little. On the 3d the skin was of natural temperature and presented some rose-colored spots, which were perceptible to the touch and disappeared on pressure; the bowels, which had been quiet since admission, were on this day moved four times. He rested well at night, and on the 4th had a natural skin, moist and slightly brown tongue and feeble pulse, 90 per minute; three stools were passed. During the following week the patient continued without much change. On the 5th there was some ringing in the left ear, with slight headache on the following day; on the 10th marked deafness with tinnitus aurium. The bowels were somewhat relaxed at this time, the pulse from 80 to 100, the skin natural and the tongue brownish and inclined to be dry or, occasionally, moist and yellow-coated except at the edges, which were red. On the 11th fifteen grains of quinine, with six of blue-pill and two of opium, were given in two doses at an interval of two hours, with four grains of quinine every two hours thereafter. During the night profuse sweating occurred, and next day there was no stool. On the 14th the patient was transferred to Baltimore, Md.

Case 117.—*Diagnosis—remittent. Bowels loose and tympanitic; no characteristic symptoms of typhoid.*—Private O. Gunderson, Co. B, 6th Wis. Vols.; age 19; was admitted Nov. 8, 1861, having been attacked about the 1st with chills and fever, headache, pain in the back and limbs and anorexia. On admission he was wakeful and suffering from headache, his countenance anxious, eyes dull, cheeks flushed, pulse 100 and thread-like, skin about the natural temperature, tongue red and moist at the tip and edges, dry and coated yellow in the centre, appetite lost and bowels loose and tympanitic; he had some cough with whitish expectoration. One drachm of sweet spirit of nitre was given every hour. Small doses of blue-pill and opium were prescribed on the 9th and repeated on the 10th and 11th, with twelve grains of quinine each day, and with eight grains on the 12th, on which day beef-essence and emulsion of turpentine were also administered. The tongue, however, remained coated yellowish-white and the appetite poor up to the 19th, when the last notes were entered on the record. The patient was transferred to Baltimore, Md., December 3.

Case 118.—*Remittent fever followed by typhoid.*—Private A. Whipple, Co. A, 4th Mich. Vols.; age 19; was admitted Oct. 30, 1861, as a case of remittent fever. On October 8 he had chills and fever which continued a week, with weakness, anorexia, nausea and vomiting, and during this period he felt better in the morning than in the evening. He was treated with quinine, rhubarb and capsicum. On admission his cheeks were slightly flushed, countenance calm, eyes bright, conjunctivæ yellow, pulse 99, full and strong, skin yellow, warm, dry, soft and without eruption or sudamina, tongue moist, red at the tip and coated grayish in the centre, appetite deficient; the bowels were moved five times, and there was abdominal tenderness with slight gurgling but no meteorism. Calomel and full doses of quinine were prescribed. During the night the patient was delirious at times, and on the following day he had some deafness and tinnitus aurium. The quinine was continued and the calomel omitted. On November 1 the tongue was moist, pale and coated somewhat in the centre and at the base. Next day two rose-colored spots were noticed and sordes appeared on the teeth. Milk-punch, beef-essence and turpentine emulsion were prescribed. On the 4th the patient's condition was unchanged; he was very delirious, his face much flushed, pulse 98 and strong, skin very hot and showing some rose-colored spots, tongue dry in the centre but moist at the edges; he had no cough, but mucous and sibilant râles were heard in some parts of the chest; the bowels were moved by an enema of castor oil and turpentine and the tympanites which had been present was thereby reduced. He was dull and stupid on the 5th and had subsultus tendinum. Next day some petechial spots appeared. No further details are given. The patient was transferred to Annapolis, Md., on the 18th.

Case 119.—*Typhoid fever following remittent fever; prognosis favorable until the advent of peritonitis.*—Private Abraham Haner, Co. D, 14th N. Y. Vols.; age 21; was admitted Sept. 23, 1861, as a case of remittent fever. He had been epileptic from infancy to the age of 19, when the fits ceased. He was taken two weeks before admission with a convulsion. Quinine was given but the convulsions recurred. On admission his face was flushed, eyes injected, bowels loose and abdomen painful. A slight fever was present on the 25th; appetite deficient, thirst considerable, pulse 88, full and strong, skin warm and moist (he had perspired profusely at night), tongue light-brown and fissured; he had a little headache and dizziness. Acetate of ammonia was prescribed with five drops of Fowler's solution four times daily. He did not sleep well at night, and on the 26th was restless, his cheeks flushed, eyes suffused, pulse 96, skin hot and moist, tongue brown and dry in the centre, fissured and moist at the edges; he had headache and slight delirium, pain in the stomach, pain and great tenderness in the iliac region, some cough and

difficulty in retaining urine. The acetate of ammonia was continued and turpentine emulsion was ordered for administration every two hours. In the evening the skin was moist, the pulse 102, the tongue yellowish. Hoffmann's anodyne was prescribed in drachm doses every four hours. He slept but little during the night, and on the 27th the pulse was 96, skin hot and dry, tongue dry in the centre, moist at the edges; he had headache, anorexia, tympanites on the right side, tenderness in the right iliac region and his bowels had been moved six times. Turpentine emulsion and Fowler's solution were renewed and pills of opium, lead and tannin prescribed. In the evening the pulse was 104, the skin hot and moist but with no eruption nor sudamina, the tongue rather yellow in the centre but less fissured; the headache was lessened and the diarrhœa reduced to one stool, but the tenderness and tympanites continued. Sweet spirit of nitre and wine of antimony were administered during the night. He slept well and perspired early in the morning; no stool was passed. On the 28th the skin was hot and moist, tongue brown, dry and fissured in the centre, its edges moist and white; the anorexia, headache and cough persisted, and there was partial retention of urine, with pain in the hypogastrium. Extract of buchu was given. In the evening the face was flushed, eyes bright, pulse strong and regular, skin soft but somewhat hot, tongue moist, white and fissured; bowels moved once, tender and tympanitic; the cough had subsided and the appetite was returning. Dover's powder was ordered. He slept well during the night, and on the 29th the face was somewhat flushed, eyes injected, pulse 88 and strong, skin hot and moist, tongue brown and dry in the centre, moist at the edges, the bowels quiet but a little tender and tympanitic. In the evening there was slight headache; the bowels were moved once, but the tenderness and distention continued; the appetite was good. Tincture of opium and essence of peppermint were administered. On the 30th the skin was soft and its temperature decreased; the tongue moist at the edges, brown and dry in the centre, the appetite moderate; three stools were passed and there was much tympanites with marked tenderness in the right iliac region and some in the left side. On October 1 the skin was natural, the tongue slightly coated in the centre and fissured, the appetite good and the bowels quiet. He improved after this, so that from the 3d to the 6th no note of his condition was recorded. On the 7th the pulse was 85, skin natural, tongue moist but red at the tip and edges, yellow and fissured in the centre; bowels moved three times. No marked change occurred until the 10th, when the skin became hot and dry, followed on the 11th by a profuse eruption of rose-colored spots; on this day the tongue was slightly moist, yellow in the centre, the appetite good and the bowels quiet, but the abdomen was tender and tympanitic, especially in the umbilical and right iliac regions. Tincture of iron was prescribed. Fresh crops of rose-colored spots appeared at intervals until the 28th, when they faded. The heat of skin gradually lessened until on the 16th it became normal; two days later the skin was moist. The bowels were moved once or seldom twice daily, but a good deal of tenderness and distention was noted in the umbilical and right iliac regions. On the 20th extract of senna was administered and two passages followed its exhibition. The patient usually slept well and his appetite was good; the tongue was moist and clean, faintly furred or yellow-coated in the centre. He appeared to be doing well when, on the 29th, he was seized with extreme tenderness of the abdomen. After a wakeful night his eyes on the 30th were dull, cheeks flushed, pulse 100, skin hot, tongue moist, brown and fissured, lips and teeth covered with sordes; he had some deafness and mental dulness, anorexia and thirst; there was no diarrhœa, but much general abdominal tenderness and some tympanites. A blister was applied to the abdomen and calomel and opium prescribed for administration every three hours. On the 31st the pulse was 140 and irregular and the skin bathed in perspiration, but the abdomen was less tender. Death took place on this day.

Case 120.—*Remittent fever and a recurrence of remittent overlapping the typhoid case.*—Private E. J. Tice, Co. G, 14th N. Y. Vols.; age 23; had chills, perspirations, pain in the head and umbilical tenderness on Sept. 28, 1861, and was admitted October 2 as a case of remittent fever. On the evening of admission the patient's pulse was not accelerated, but his face was flushed, eyes injected and skin hot; his tongue was moist and coated white, appetite deficient, bowels tender and moved once during the day. Blue-pill and opium were given. Next morning the tongue was coated yellow and bowels moved; pulse 80, strong; skin perspiring. Quinine was ordered to be taken at the rate of sixteen grains a day, with Dover's powder in the evening. This condition of slight fever with yellow-coated tongue, anorexia and some headache continued for several days; but in the meantime the bowels became quite loose, meteorized and tender, especially in the right iliac region. On the 8th the tongue was red at the tip and edges and yellowish-white in the centre, the appetite improved and the pulse lowered to 60. Tincture of iron was ordered. During the following week the bowels were less affected, only one or two stools being passed daily; the skin was of the natural temperature and sometimes perspiring, the appetite good, but a slight headache persisted. A chill occurred suddenly on the 16th, and next day the pulse was 100, full and strong, the skin hot and dry, the tongue slightly moist, white at the sides, yellow in the centre, the appetite poor, the bowels moved once, the abdomen tender, especially in the right iliac region. Blue-pill and opium were given in repeated doses. On the 18th the pulse fell to 70 and several rose-colored spots appeared on the skin; but the tongue continued coated until the 28th, Fowler's solution having been given in the meantime, and the headache, relaxed bowels and abdominal tenderness lasted for ten days longer. The patient was transferred, November 18, to Annapolis, Md. [as a case of typhoid fever; he was returned to duty with his regiment December 2].

Two Cases entered as Typhoid, but in which only the Malarial Element was prominent.

Case 121.—*Malarial symptoms prominent; the presence of enteric fever not clearly established.*—Private Matthew Baird, Co. C, 3d Mich. Vols.; age 23; was admitted Oct. 19, 1861, as a case of typhoid fever. About October 5 he had been seized with pain in the head and bones, fever and chills; he had some nausea and vomiting at first, and a diarrhœa which continued for two days; the headache lasted four days; during the second week his urine had to be removed by catheter. On admission his pulse was 62 and of fair strength, skin soft and warm, tongue pale, moist and slightly coated brownish in the centre, appetite good; he had tinnitus aurium and giddiness, but no pain, eruption

nor sudamina; one thin watery stool was passed, but there was no tenderness, borborygmus nor tympanites, and the abdomen was soft; there was no cough and the urine was normal. Quinine was prescribed in full doses three times daily. Next day the face was calm and natural, the pulse 64, steady and of fair strength, the skin soft and warm, the tongue slightly pale and flabby but moist and clean, the appetite good; one thin fetid stool was passed. On the 22d the quinine was reduced to two grains three times daily, and during the night the patient had a chill, but next day its effects disappeared. On the 28th he rested badly and had some diarrhœa, but there was no tenderness nor tympanites; the tongue was pale and moist and the appetite fair. The skin and conjunctivæ became jaundiced on the 31st. Small doses of calomel and opium were given. November 4 he slept well; his mind was clear, countenance calm, bowels regular and appetite good. He was transferred to Annapolis, Md., on the 18th.

CASE 122.—*Death in eight days. Diagnosis—typhoid, but symptoms and treatment those of remittent fever.*—Private Edwin Graves, Co. D, 86th N. Y. Vols.; age 26; was admitted March 17, 1862. He was taken sick about the 12th with pain in the chest, headache, nausea, a feeling of general swelling and much debility, succeeded by a chill, fever and profuse perspiration, which symptoms recurred daily about 11 A. M.; he had also much annoyance from a numb feeling in his fingers. On admission the pulse was rapid and weak, the skin hot and moist, the tongue moist, red and slightly coated; the patient's appetite was poor and he had some diarrhœa and pyrosis; he stated that the chill and fever occurred at the same time in rapid alternations in different parts of the body, the paroxysms lasting two or three hours. Twenty-four grains of quinine were directed to be taken during the day. He was delirious during the 18th; his pulse rapid and weak, skin natural, tongue moist and coated white. Punch and beef-essence were given every two hours. He died delirious on the morning of the 19th.

The last case of this series appears to have been one of mistaken diagnosis:

CASE 123.—Private Wm. H. Courtney, Co. B, 24th N. Y. Vols.; age 24; was taken Sept. 4, 1861, with pain in the shoulders and left side and also on breathing; he had chills and fever and had been blistered. He was admitted on the 18th. Diagnosis—typhoid fever. The pulse was 46, skin cool and moist, left side tender and dull, respiration short, decubitus on the sound side, tongue smooth, nearly dry, bowels constipated and tender in both iliac regions. Two grains of calomel and one-fourth grain of morphia were prescribed. Next day the pain was less sharp, the præcordia seemed elevated and the sounds of the heart were obscured. In the evening the patient was drowsy, pulse 50 and irregular, skin natural, tongue slightly coated gray posteriorly, red at the tip. Calomel in two-grain doses with opium was given every two hours. On the 20th there was acute tenderness in both iliac regions but the bowels continued constipated. On the 21st the breath became fetid, and on the following day the gums were swollen and tender. The mercurial was omitted. On the 24th chlorate of potash was given on account of the salivation. The patient was walking about and had a good appetite on the 30th, and was doing light duty in the ward on October 3. He was returned to duty on the 17th.

FEVER CASES FROM REGIMENTAL RECORDS.—The symptoms of typhoid fever assumed a prominence in the typho-malarial cases of the Seminary Hospital, and no doubt in those of other general hospitals, which was not shown in the cases occurring at the same time in the field. This difference in character was a consequence of the greater prevalence of remittent fevers at the front. Remittents seldom reached the general hospitals, as they proved fatal if pernicious, or recovered if of a mild type, under the influence of quinine, at the regimental or field division hospitals. Similarly, if the remittent fever masked an existing typhoid, the notable symptoms in a rapidly fatal case were those of the pernicious fever, while in a mild attack the treatment prior to the transfer to the general hospital had its effect on the malarial symptoms and left the case for the records of the hospital as one of comparatively unmodified typhoid. But even in the febrile cases treated in the field the symptoms of typhoid fever were sometimes so strongly developed as to leave no doubt concerning the nature of the disease. Not only was this the case in local epidemics occurring in non-malarious districts, but in commands which at the same time reported numerous cases of malarial fever, the presence of which led to a routine administration of quinine in all febrile cases. This may be illustrated by a series of cases from the records of the 27th Connecticut Volunteers. Fevers had prevailed in this regiment from the establishment of winter quarters at Falmouth, Va., after the battle of Fredericksburg. Thus, in January, 1863, there were reported on the monthly report of sick and wounded six cases of typhoid, seven of typho-malarial, three of intermittent and sixteen of remittent fever; but the details of none of these cases are preserved. In February and March, the months during which the recorded cases were treated in the regimental hospital,

no typho-malarial cases were reported, the fevers being entered either as remittent or as typhoid. The histories of thirteen cases of typhoid are recorded; one of these, in which the body was examined after death, is presented as case 330 of the *post-mortem* records of the continued fevers;* the others are given below in the order of their admission for treatment. Appended to the record of the first case is a remark by the regimental surgeon, Wm. O. McDonald, as follows:

I regard this as a purer case of typhoid fever than that of Dolph, for this was uncomplicated. The rose-spots appeared on the seventh day of his stay in hospital, the disease having probably made some progress before any record was kept of the case.

Case 1.—*Delirium; involuntary stools; abdominal tenderness; rose-colored spots; improvement from the end of the second week.*—Private H. E. Burnham, Co. H, 27th Conn. Vols., having been complaining for two or three days, was admitted Feb. 2, 1863. The pulse was 132, small and weak, and the muscles of the body were sore to the touch. On the 5th the tongue was dark-colored and there was some delirium. Sixty grains of quinine were administered in three doses during the day. On the 7th the bowels were moved twice and there was tenderness over the cæcum and ascending colon. Next day the pulse was 132, tongue dry, red and cracked, lips black; the patient was very delirious and had several involuntary passages from the bowels. Stimulants were given. On the 9th the pulse was 132, tongue a little more moist, bowels quiet and delirium lessened; six rose-colored spots were found on the abdomen. The patient was not so well next day; the tongue was dryer and darker; the abdomen was distended and gurgled on pressure in the right iliac fossa, and there were several ineffectual attempts at stool. On the 11th the tongue was dry as ever and the lips as black, but the patient was able to talk sensibly. After this the pulse gradually fell to 80, the tongue became clean and moist, the abdominal tenderness ceased and the appetite improved; but the return to health was slowly effected.

Case 2.—*Low fever and hebetude; diarrhœa and abdominal tenderness; night-sweats and œdema of legs; recovery.*—Private William A. Morse, Co. H, 27th Conn. Vols., was admitted Feb. 2, 1863, after exposure on picket duty to cold, wet and stormy weather. Diagnosis—typhoid fever. Stupor; pulse 96; tongue dry and red; twelve stools; tenderness in the right iliac and hypogastric regions. 3d: Dull and stupid; pulse 88, full, soft; skin moist; tongue dry and red; one stool; tenderness; pains in the back and limbs. 4th: Looking better; pulse 84; tongue dry; much thirst; two stools. 5th: Pulse 72; tongue red, clean, moist; tenderness below umbilicus; one thin watery stool. 6th: Pulse 84; tongue red, bare, moist; one stool; less tenderness. The patient took ten grains of quinine five times a day during the first four days of his stay in hospital. 7th: Pulse 72, dicrotic; tongue red, dry, glazed: odor feverish; eyelids dusky; iliac and hypogastric tenderness. 8th: Tongue dry, glazed; face dusky; three stools. Whiskey was prescribed. 9th: Pulse 78; tongue moister; one stool. 10th: Two stools. 13th: Pulse 84; tongue glazed, bare; one stool. For some days anterior to this date the patient had been taking solid food. On the 27th aromatic sulphuric acid and quinine were given on account of night-sweats. These recurred on March 12, but were immediately controlled by renewing the acid medicine. He was very pale and anæmic; iron was prescribed. After this his legs became œdematous. He was not returned to duty until May 24.

Case 3.—*Febrile attack during convalescence from jaundice;† diarrhœa and right iliac tenderness; mental dulness; moaning respiration; dusky skin; great prostration and tremulousness; death on 13th day.*—Private Joseph Hull, Co. I, 27th Conn. Vols.; intemperate; suffered in January, 1863, from an attack of jaundice from which he convalesced slowly. On February 18 he was taken into hospital. Fifty grains of quinine were prescribed for administration during the day. On the 19th the pulse, which had been very slow for some days, rose to 60, the lips were black, tongue red and dry, bowels quiet and free from pain. The quinine was omitted on the 20th. On the 21st the patient was drowsy, mind dull, speech thick, bowels moved twice and abdomen tender; deafness, which was probably in part induced by the quinine, became somewhat lessened. Beef-tea and stimulants were ordered. Little change took place until the 26th, when the bowels became more relaxed; on this day four watery stools were passed, the tongue was dry as a board, pulse 84, respiration moaning, hands tremulous. Next day the tongue became somewhat moist, the hearing improved and there was less dulness and wandering of the mind; the bowels were moved three times and the right iliac region was tender. On the 28th the pulse rose to 120, the respiration to 27; the tongue was dry and cracked but not very dark, the skin dusky or purplish; the patient slept with his mouth open and moaned with each breath; he was emaciated and extremely prostrated. Death took place March 2.

Case 4.—*Bronchitis; slight diarrhœa and delirium; sordes; rose-colored spots about the 10th day; favorable signs at end of second week; distention and ecchymoses of the abdomen; bed-sores; pneumonic symptoms and death at the end of the fourth week.*—Private Charles L. Alling, Co. H, 27th Conn. Vols.; age 18; a slender boy, was first seen Feb. 18, 1863, suffering from a cold contracted while on picket duty. Veratrum viride was given daily until the 21st, when it was omitted and quinine substituted, sixty grains in divided doses during the day. He was admitted to hospital on the

* *Infra*, page 408, case of Private E. B. Dolph.

† Surg. J. T. Webb, 23d Ohio Vols., in a letter dated Feb. 10, 1862, at Fayetteville, Va., and published in the *Cincinnati Lancet and Observer*, Vol. V, p. 171, makes the following statement: "At the close of this month jaundice made its appearance, and what is most remarkable, its advent among us appears to have eradicated all the different forms of fever, and since the 10th of January, just one month this day, not a single case of fever of any description has made its appearance. * * * For the first time since we have been in Western Virginia, a little more than seven months, one whole month has passed without a case of camp-fever occurring in our midst." Jaundice prevailed in the camp of the 27th Conn. Vols. at Falmouth, Va., during January, 1863, but its prevalence was not associated with that disappearance of fever which occurred in the experience of Surgeon Webb. See *infra*, p. 875.

22d as a case of typhoid fever with bronchial complication. Small doses of ipecacuanha, opium and camphor were administered. On the 23d the pulse was 96 and the bowels tender but quiet. Three ten-grain doses of quinine were given during the day. On the 25th the tongue was dark at the base, red at the tip, the lips and teeth black, the bowels moved twice, the mind wandering. He had been taking beef-tea and quinine up to this time; whiskey was now added. A few indistinct rose-colored spots appeared on the 27th; speech was difficult and incoherent. There was some dysuria on the 28th, relieved by hot fomentations to the abdomen; the tongue was dry, dark and cracked; pulse 108. The patient had coughed more or less since his admission, but at this time the chest symptoms became more prominent. On March 2 the pulse was 120 and dicrotic, the abdomen tender, the bowels moved three times, the stools thin and watery; the hands and cheeks were purplish in color; speech somewhat less incoherent. On the 4th the pulse was 120, tongue slightly moist and softer than heretofore, face pale; the patient took some interest in his condition and suffered much from abdominal distention. Turpentine was prescribed. On the 5th the pulse was 108 during sleep, 132 while awake, respiration 23, tongue dry, abdomen distended and ecchymosed, skin over sacrum congested. On the 6th the pulse was 144, respiration 36, tongue dry, cracked, dark and bloody. No material change took place until the 8th, when the integuments over the sacrum formed a sloughing bed-sore. On the 10th much flatus was passed from the bowels with great relief to the patient; dysphagia was noted at this time. On the 14th the pulse was 128 to 132, respiration 36 to 40, pulse dicrotic, cheeks flushed, lips and nose white, tongue dry, brown and cracked; the distention of the abdomen was again a cause of much suffering and prevented the patient from taking his allowance of beef-tea and whiskey; the bowels were moved twice. On the 16th the dicrotism of the pulse ceased, the tongue became more generally moist, and the patient smiled in answer to a question. But delirium returned on the 19th, respiration became reduced to 26 and the lower jaw moved with each breath; the expectoration was rusty. Death took place on the 21st.

Case 5.—*Bronchitis; tenderness over colon, but a large cathartic dose produced no injurious effect; pink spots on chest about 9th day; no cerebral symptoms until late in the attack, when the delirium noted was probably due to continued pain in the feet and morphia given for its alleviation; gangrene of the feet; death.*—Private Wm. F. Bernhardt, Co. K, 27th Conn. Vols., was admitted March 17, 1863. Diagnosis—bronchitis and probable fever. He had taken veratrum viride for two days. On the 18th the pulse was 96, respiration 20, tongue dry in the centre; there was some cough with expectoration and substernal soreness, and the right iliac and umbilical regions were tender. During the five following days two hundred and forty grains of quinine were taken in ten-grain doses, the tongue meanwhile becoming red at the tip and edges and somewhat moist and the cough and scanty mucous expectoration continuing. There was tenderness along the track of the colon but no movement of the bowels. Five compound cathartic pills were administered on the 21st, and two stools were passed on the following day. Some pink spots appeared on the chest on the 23d. On the 25th the tongue was moist and cleaning, the abdomen covered with sudamina, but the right foot was very painful and numb. For some days there was little change in the condition of the patient: Pulse 108; respiration 20, with slight cough and expectoration and râles posteriorly; tongue clean and moist; appetite good; face natural; bowels quiet and free from pain; feet very painful especially at night, requiring the administration of large doses of morphia to give rest and relief. Aconite and turpentine liniments were used but without benefit. On the 29th the dorsum of the right foot became purple and cold and the leg immediately above the ankle puffy; two days later the left foot became similarly affected. Small doses of tincture of iron, quinine and sweet spirit of nitre were prescribed and great attention was paid to the diet of the patient; hot bricks and flannel wrappings were applied to the feet. On April 7, in addition to the ecchymosis on the dorsum of the right metatarsus, a slough extended over most of the toes; the patient was delirious during the night. One grain of sulphate of morphia was prescribed for administration at bed-time, the dose to be repeated in an hour if required. The black line forming the margin of the ecchymosed and puffy patches spread gradually towards the ankles and toes; bullæ formed on their surface. On the 16th the end of the great toe and upper surface of the toes of the right foot were hard, horny, shrunken, dry and black, while the dark patches were slowly extending over both feet. The patient was transferred to Stanton hospital, Washington, D. C., on the 19th, where he died June 15 of "typhoid fever and gangrene of the feet."

Case 6.—*Date of onset undefined; rose-spots; iliac and umbilical tenderness; pneumonia; numerous spots like small blood-blisters on the limbs and trunk; dusky skin, low delirium, tremulousness and subsultus; vomiting; epistaxis; bed-sores; recovery of intelligence for a week before death.*—Private S. H. Plumb, Co. C, 27th Conn. Vols.; age 22; had been treated in quarters for quite a long time before his admission into hospital, March 23, 1863, as a case of typhoid fever. The pulse was 88; respiration 16; tongue shrunken, furred and dry, the tip and edges red; eyes somewhat yellow; hearing dull; chest and abdomen covered with sudamina and a large crop of red and pink spots, disappearing on pressure; bowels moved once daily, and tender in the iliac and umbilical regions. There was free perspiration during the night of the 24th, and next morning some of the sudamina had coalesced into bullæ containing turbid yellowish-white liquid; one loose watery stool was passed. Twenty-five grains of sulphate of quinine were given three times daily with aromatic sulphuric acid. Next day there was no sweating, but the condition was otherwise not much changed; pulse 108; bowels moved twice; no abdominal tenderness; red spots disappearing; sonorous râles posteriorly on both sides of the chest. On the 27th the quinine was continued in ten-grain doses three times daily, but the acid was omitted; the expectoration was white, slimy and adhesive, with intermixture of scarlet blood; there was soreness over the ascending and transverse portions of the colon. On the 28th the patient was reported as having had some delirium in the early part of the night; the skin of the abdomen was desquamating. Small doses of ipecacuanha and opium were given. The quinine was omitted on the 29th; the chest was not tender on percussion, but the sputa contained bright blood. On the 30th the pulse was 96; respiration 16; tongue cleaner and less dry; bowels moved once; abdomen somewhat sore all over; sputa thick and adhesive, containing bloody masses;

small crepitation was heard in the left lung under the fourth rib. Carbonate of ammonia was prescribed. On the 31st he was again reported as having been delirious during the night. Some nearly pure blood was expectorated on April 1; the tongue was brown at the tip and centre, the lips dry, cracked and bleeding, the teeth covered with dark patches, the bowels moved once; the patient was again delirious during the early part of the night. Quinine in three-grain doses was given three times daily, with small doses of carbonate of ammonia and ipecacuanha and a full dose of morphia at bed-time. He perspired profusely on the 2d; his cheeks were somewhat flushed: many spots like small blood-blisters appeared on the limbs and shoulders and a few were present on the trunk; he was delirous and wanted to get out of bed. Beef-tea and whiskey were given at intervals during the day. The perspirations continued on the 3d; on this day some nausea was developed and the appetite, which had been very good hitherto, became affected; the expectoration was scanty, rust-colored and contained bloody masses; all kinds of murmuring, bubbling and rattling were heard in the chest; pulse 100; respiration 26 and irregular. On the 4th there was some vomiting, no stool, but some tenderness in the right iliac and umbilical regions; the small purplish ecchymosed spots were fading from the arms, but those on the abdomen were very numerous and presented a purpura-like appearance. On the 6th the pulse was 120, respiration 30 and irregular, tongue dry, brown, hard and fissured, lips dry and cracked, cheeks slightly flushed of a dusky-violet color; the stomach rejected solid food; one natural stool was passed; the purpuric eruption appeared on the back and hips. On the 7th the ecchymosed spots increased on the abdomen; there was frequent but scanty vomiting and an incoherent muttering, with tremulousness of the hands and incessant subsultus. Bed-sores on the hips and sacrum and continued vomiting were recorded on the 8th. Next day the eruption had nearly faded; the pulse was 96 and respiration 28, the lower jaw participating in the respiratory movement; a copious epistaxis occurred; the stomach was less irritable. On the 10th the face was pale and sunken, the hands and jaw twitched and there was occasional moaning on inspiration, but the lower jaw did not move as on the previous day. Next day he seemed to recognize the attending physician. On the 12th the tongue was somewhat moist and the patient brighter; he talked a little. From this time until death on the 18th he retained his intelligence, sometimes expressing his wants. The vomiting ceased and he swallowed the beef-tea, whiskey, etc., offered him without objection. As the left hip and back were raw and granulating, he lay usually on the right side. For two or three days the bowels were slightly relaxed. A peculiar odor, like that of spoiled meat, was noticed about his person. Cough was troublesome but useless, as it brought up nothing from the lungs. On the day before death the respiration suddenly rose to 44, the pulse being 120; on the day of death the pulse fell to 60, respiration being 48.

Case 7.—*Deafness; delirium; perspirations; rose-colored spots; diarrhœa; recovery.*—Private Daniel Doolittle, Co. A, 27th Conn. Vols., was admitted on the evening of March 23, 1863. Next day the pulse was 84 and dicrotic, tongue clean and moist, skin moist, conjunctiva of right eye inflamed, throat sore; one thin dark-colored stool was passed and the abdomen, which was full and soft, was somewhat tender over the track of the colon; the patient was deaf and talked thickly in a dull delirium. Quinine in ten-grain doses was prescribed for administration five times a day and thirty grains of blue-pill were given at night. On the 25th there was free perspiration but no sudamina; one faint rose-spot was found on the chest; the lower eyelids were so dark as to seem ecchymosed; the bowels were moved twice; the patient was sullen and ate nothing; during the night he had been violently delirious. No medicine was given. On the 26th the pulse rose to 108, the tongue became somewhat dry and the delirium of a jocose character. Quinine in ten-grain doses was given three times a day with morphia at night. On the 27th the pulse was 120; the patient rested better at night, and although dull and stupid gave rational replies to questions; one thin stool was passed. On the 28th the tongue was furred at the base, clean at the tip and edges, pulse 96; delirium had returned during the night; two stools were passed and the abdomen was tender over the cæcum and the ascending and transverse portions of the colon. The prescriptions of the 26th were repeated. On the 29th the pulse was 72; a few elevated pink spots appeared on the abdomen and the upper eyelids seemed ecchymosed. The tongue was clean and moist on the 30th; three stools were passed and the bowels were tender. On the 31st the patient was rational and the spots fading, but the bowels continued loose and tender. On April 1 there was vomiting, the condition of the bowels remaining unchanged. Quinine in three-grain doses with whiskey, and at night morphia, were prescribed for administration. On the 2d a few spots appeared on the chest and abdomen; five stools were passed. On the 3d three stools, resembling pea-soup, were passed, and the patient was very thirsty; but after this the diarrhœa ceased, so that on the 9th a compound cathartic pill was given, which was not followed by any alvine movement until the 11th. Meanwhile the patient's appetite had returned; on the 7th he had been permitted steak for breakfast. He was transferred to division hospital on the 21st.

Case 8.—*Delirium, perspirations, pink-colored spots; constipation until after the free administration of purgative medicines; recovery.*—Private Amos N. Benton, Co. C, 27th Conn. Vols.; age 36. This patient had suffered from jaundice, for which mercury and ipecacuanha had been taken. He fainted on the night of March 23, 1863, and was admitted next day. He became very delirious in the afternoon, expecting to die, and thinking that the attending physician had killed him. On the 25th the pulse was 96, respiration 24, tongue moist and brownish, skin sweating constantly and freely; he had a slight cough which had troubled him for two weeks before his admission. The delirium continued during the night but abated and ultimately ceased towards morning, the patient becoming rational. The skin was bathed in perspiration on the 26th, but was free from sudamina; the abdomen was swollen and there was some gurgling in the right iliac fossa. Quinine was given in ten-grain doses three times, and morphia ordered for use at bed-time. On the 27th some faint pinkish-colored spots were found on the abdomen. As the bowels had not been moved since admission, four compound cathartic pills were given. Next day the tongue was a little dry at the tip, the bowels were moved twice without pain, the perspirations continued and the patient was in a constant delirium. Two stools followed on the 29th, none on the 30th, but the perspirations and delirium

remained unabated. The face was pale on the 31st and the patient sullen although not particularly delirious; the perspirations had ceased. Next day the sweating was renewed and continued until the bowels became disturbed. He was rational on the 3d and his appetite returned on the 4th; he complained at this time of his hips being sore; eight or ten spots or pimples appeared on the abdomen, fading on the following day, except one which developed into a pustule. As the bowels on the 5th had not been moved for six or seven days, three compound cathartic pills were given. Next day two stools were passed, and on the 7th six, which were small, bloody and accompanied with tenderness in the right iliac and epigastric regions. An ounce and a half of sulphate of magnesia was given, producing six copious watery stools on the 8th. During the three following days the bowels were moved twice daily. On the 11th and 12th the perspirations recurred, and quinine in three-grain doses, with aromatic sulphuric acid, was administered. On the 13th eight stools were passed and the patient perspired but little. An ounce and a half of sulphate of magnesia was given, and morphine prescribed for use at night to produce rest and quiet the bowels. Four stools were passed on the 14th but none on the 15th. Again on the 16th the bowels were moved four times. Meat and vegetables were omitted from the diet, the patient being placed on tea, toast and rice; one ounce of castor oil was given. On the 17th three stools were passed, and there was tympanites with gurgling and some tenderness of the abdomen. After this the bowels were moved twice daily until the close of the record. On the 18th tincture of iron was prescribed, and beefsteak and potatoes allowed. On the 20th the patient complained much of pain in his foot. On the 21st he was transferred to division hospital. During the continuance of this case there was some cough with frothy mucous expectoration, and at times some acceleration of the respiration.

Case 9.—*Diarrhœa and umbilical tenderness; pneumonia; rose-colored spots; delirium; epistaxis; recovery.*—Private Patrick Glinn, Co. G, 27th Conn. Vols.; age 24; was admitted from quarters March 28, 1863. Next day the pulse was 96, respiration panting, tongue yellow, furred in the centre and moist, bowels tender, especially in the umbilical region, and moved six times; the patient had eaten nothing for four days. A full dose of castor oil was given. On the 30th the pulse was 104 and dicrotic, the respiration 28, the tongue furred white or yellowish-white but red and somewhat dry at the tip; the bowels were moved five times and continued tender. Quinine in ten-grain doses was given with opium three times a day. The diarrhœa persisted, giving daily three to five stools resembling pea-soup, until April 8, when it ceased; it was accompanied by tenderness in the epigastric region, tenderness and gurgling in the umbilical and right iliac regions. The respiration continued somewhat accelerated, about 24, and on the 1st the sputa became rusty, changing in a few days to yellow matter mixed occasionally with bloody lumps, and retaining this character until the 10th, after which the pulmonary symptoms lost their prominence. Some indistinct rose-colored spots appeared on March 31; eight were noted on the abdomen on April 1, and about fifty on the following day. On the 1st the quinine was diminished to three grains three times daily, with whiskey and morphine, beef-tea, toast and rice; carbonate of ammonia was prescribed on the 5th, but as it seemed to cause vomiting its administration was suspended. No delirium or other head-symptoms had been noted up to this time, but on the 7th there was deafness, and although the pulmonary symptoms were improving, the respirations being but 18 per minute, the face was of a dusky-purplish color. On the 8th the face was less dusky and the appetite returning. On the 9th there was epistaxis and the integuments over the sacrum were reddened. Sudamina appeared on the 11th, many of them occurring on the site of rose-colored spots which were yet present. At this date free perspiration began to occur at night and continued to the end of the period covered by the record. The eyes were jaundiced on the 12th, and two days later delirium occurred for the first time in the progress of the case. Quinine in small doses, with aromatic sulphuric acid, was given on the 16th. On the 18th the pulse was 72, the tongue clean, appetite good and bowels quiet; there were many rose-colored spots on the abdomen and the sudamina were shrinking. Steak was permitted to be used and tincture of iron prescribed. Next day the patient was transferred to division hospital.

Case 10.—*Bronchitis; diarrhœa and abdominal tenderness, chiefly umbilical; febrile movement slight; rose-spots on 8th and 16th days; recovery.*—Private Frederick Buckley, Co. A, 27th Conn. Vols.; age 19; was taken with diarrhœa Dec. 1, 1862, and sent to general hospital. On his return to the regiment the disease recurred after exposure on picket towards the end of March, 1863. He was admitted to hospital on the 28th, and on the following day the pulse was 84, respiration 20 to 24, tongue furred white and its papillæ projecting; he had ten stools during the twenty-four hours, and there was tenderness over the entire course of the colon, particularly over the transverse colon. Quinine in five-grain doses was given three times a day. On April 1 the bowels were quiet, the tongue red at the tip and edges and less moist; there was cough with thick white expectoration; the abdomen was full, tender in the epigastric and umbilical regions and tender and gurgling on pressure in the right iliac region. On the 4th two pink-colored and slightly raised papules were observed on the abdomen. After this the patient improved; his bowels were but slightly relaxed and the tenderness diminished daily; the cough lessened and the respirations became of normal frequency, though continuing somewhat labored; his appetite returned and he was allowed meat twice daily. No cerebral symptoms are mentioned as having been present. Perspirations and sudamina were noted on the 12th, as also a few rose-colored spots on the abdomen, but the bowels continued quiet and free from tenderness except in the umbilical region; a cathartic pill on the 16th caused but one movement. The case was transferred to division hospital on the 19th. [This man was ultimately returned to duty from the Mower hospital, Philadelphia, July 20.]

Case 11.—*Nausea and vomiting; slight diarrhœa and tenderness in the umbilical and iliac regions; pink spots on the abdomen and chest; recovery.*—Private Wm. A. Beard, Co. C, 27th Conn. Vols., having been feeling sick for a week, was admitted to hospital April 5, 1863. Next day the pulse was 96, respiration 20, tongue brown and dry in the centre, bowels slightly relaxed and tender on pressure in the right iliac fossa; he had anorexia, thirst, nausea and vomiting but no cough. Quinine in five-grain doses was given three times daily. The tongue became dry and rough as if baked or toasted, but the symptoms did not change much for the worse. The bowels were moved once or twice daily, the passages thin and watery; sometimes there was no movement during twenty-four hours, but

tenderness chiefly marked in the umbilical and iliac regions, was present. On the 10th the patient was reported as looking brighter and laughing. On the 13th one red pimple was found on the abdomen: it faded on the 14th: meanwhile there was some vomiting on the 12th. Three pink spots appeared on the abdomen and chest on the 15th, fading on the 18th. Some headache was reported on the 17th. On the 19th, when the patient was transferred to division hospital, the tongue was sticky and somewhat furred, the appetite fair and the bowels quiet and not tender. Roasted apples formed a part of the dietary throughout the progress of this case.

CASE 12.—*Shivering chills: abdomen tender and tender: rose-colored spots: nocturnal delirium: record incomplete.*—Private H. R. Ishell, Co. G, 27th Conn. Vols.: age 30: was admitted April 8, 1863, having been sick in quarters since March 29 with chills daily in the afternoon or evening. On the 9th the pulse was 72, respiration 24, lips cracked, tongue moist and white furred, bowels quiet but tender in the umbilical and left iliac regions: the patient was very nervous looking and did not rest well. Quinine in four-grain doses was given three times daily, with diet of toast, roasted apples, tea, rice and beef-tea. On the 10th there was continuous headache and soreness in the chest in deep breathing. Next day about a dozen spots appeared on the abdomen. They were touched with nitrate of silver. On the 12th they were replaced by eight fresh spots: eleven others appeared next day, all of which were touched with nitrate of silver. The abdomen at this time was concave and tender and there was gurgling under pressure; sleep was disturbed by dreams. On the 14th the pulse was 88, respiration 16, tongue raw and glazed in the middle; three thin and watery stools were passed: six new spots appeared on the surface: the patient talked in his sleep. While in this condition he was transferred on the 19th to Division hospital; [he was discharged July 27.]

CASE 13.—*Febrile condition associated with bronchitis: stools infrequent but loose; tenderness over colon, but no tympanites nor rose-colored spots: cerebral symptoms slight; clinical history not suggestive of the typhoid affection.*—For this case see No. 330 of the *post-mortem* records.

It is difficult to determine to what extent the freedom of these cases from the acute manifestations of malarial disease was due to the lavish use of quinine in the medical service of the regiment. We may suppose that this treatment would have prevented chills and febrile accessions in the subsequent progress of the cases; but inflammatory processes following malarial congestions of the intestinal mucous membrane would have persisted for some time, giving rise to a more general abdominal tenderness than usually characterized uncomplicated typhoid fever. The tenderness so frequently noted in these cases in regions other than the right iliac may therefore be accepted, among other indications, as suggestive of a malarial complication. It is true that only in case 12 was the attack ushered in by recurring chills, but the concurrence of remittent fever in other members of the command, the existence of fevers reported as typho-malarial during the preceding month, and the method of treatment adopted by the medical officers, give sufficient countenance to the opinion that typhoid fever in these instances occurred in those who had been exposed to the malarial influence.

If the practice of keeping clinical records of fever cases had been generally, instead of exceptionally, followed, there would have been ample proof that in a large class of cases the symptoms were not such as to indicate with certainty the specific typhoid or malarial origin of the febrile phenomena. Fortunately Surgeon J. F. Dyer, 19th Mass. Vols., has preserved in his regimental case-book a series of sixteen cases which illustrates the difficulty that was frequently experienced in making a diagnosis. Three of these cases have already been presented as Nos. 5, 13 and 41 of the malarial series; the others are given below. Cases 1 and 2 were regarded as remittents; in fact typhoid fever appeared to be excluded by the absence of symptoms specially indicative of that affection. No. 3, in which no diagnosis was entered, was of a similar character. In case 4 there was in addition some bronchial inflammation. No. 5, although reported as remittent, presented certain symptoms—abdominal pains, diarrhœa, tinnitus and continued ill health—which become of interest in connection with the cases accompanied by more pronounced indications of typhoid fever. A similar remark applies to the deafness in case 6. In 7, 8 and 9 the difficulty in discriminating between an adynamic remittent and a specific typhoid fever sufficiently accounts for the absence of a formally recorded diagnosis. The fatal case, 10,

which in point of time was the first of the series, was reported as a case of typhoid. Case 11 was entered as a remittent, although presenting one or two equivocal rose-colored spots. But the rose-colored eruption in 12 appears to have suggested the presence of the typhoid poison not only in it, although the bowels were not relaxed, but in the fatal case 13, in which there was no rose-colored eruption.

CASE 1.—Private Charles C. Forbes: sharpshooter; was admitted Oct. 23, 1861, with fever and slight delirium, yellow-furred tongue, constipated bowels and offensive breath; he had an eczematous eruption between and under the eyes, and showed a morbid desire to lie with his head covered by the bedclothes. Quinine in three-grain doses was used three times daily, with occasional purgatives such as compound colocynth pills and fluid extract of senna; milk diet was ordered. On November 11 the tongue became cleaner and the appetite improved. Tincture of iron was prescribed on the 14th and beefsteak allowed on the 16th. But the bowels again became constipated, the tongue furred and the appetite impaired. Compound cathartic pills and other purgative medicines were employed. He walked a little on the 18th and seemed improving, when, on the 25th, his feet became painful and continued so up to December 4, the date of his transfer to general hospital.

CASE 2.—Private William Reinnells: sharpshooter: was admitted Oct. 24, 1861, with remittent fever. He had been in the hospital of the 20th Mass. regiment, but the crowded condition of that establishment necessitated his removal. He was dull and stupid, had headache, tinnitus aurium and pains in the limbs; his tongue was thickly furred, appetite capricious and bowels constipated. He was treated with quinine in three-grain doses three times daily, with nitrate of potash and occasionally some cough mixture; compound cathartic pills and other purgatives were also given. On the 11th he had a slight purulent discharge from the ear. Tincture of iron was prescribed for daily use on the 12th. Beefsteak was authorized on the 20th. Pain in the feet, complained of December 1, was not relieved on the 4th, the date of his transfer to general hospital.

CASE 3.—Corporal John Cushing, Co. H, 19th Mass. Vols., was admitted Nov. 16, 1861, having been unwell for about eight days with chills and headache. On admission the pulse was 80, tongue furred and bowels painful and tender. A half drachm of ipecacuanha was given, and fifteen grains of nitrate of potash prescribed for administration three times daily. On the 17th the umbilical region was tender, the pulse 72, skin warm and dry, tongue thickly furred in the centre and red at the tip and edges, appetite deficient; the patient had headache and buzzing in the ears but no epistaxis. His condition remained unchanged for several days. Fomentations were applied to the abdomen, and castor oil and extract of senna were given without inducing a movement of the bowels. On the 21st a half ounce of fluid extract of senna and two drachms of fluid extract of rhubarb produced one dejection, and on the 24th castor oil was followed by two movements. On the 25th the nitrate of potash was omitted and quinine given in three-grain doses instead. The bowels continued constipated throughout the progress of the case, but were moved at intervals of a few days by some laxative medicine. For about a week following the 26th the patient's feet were so painful as to prevent him from sleeping at night; frictions and afterwards poultices were applied to them. On the 29th the fur began to clean from the tongue and the appetite to return. Milk diet was used up to December 8, when beefsteak was allowed. On the 15th he was sent on furlough to promote convalescence.

CASE 4.—Private F. Chandler, Co. I, 19th Mass. Vols., was admitted Nov. 10, 1861, having been ill for a week with weakness, fever and headache. On admission his pulse was 112 and his tongue dry and streaked. An emetic of ipecacuanha was given, and at night a Dover's powder. During the night sleep was disturbed by pains in the bowels, which had not been moved since the day before admission; his tongue on the 11th was dry and patched with whitish fur. Three compound colocynth pills were given; but these produced no effect until the following day, when one stool was passed. Squill and paregoric were prescribed on account of cough. On the 15th the pulse was 86, moist and cleaning, but there was no appetite. Nitrate of potash, which had been given since admission, was replaced by three grains of quinine twice daily. From this time until the 23d the patient became weaker; he did not rest well at night; cough was troublesome and was accompanied with much mucous expectoration streaked with blood; the bowels were constipated, requiring occasional doses of castor oil or extract of senna to relieve them. On the 23d the tongue became very dry and cracked. On the 25th the nocturnal restlessness increased to delirium. After a free passage, induced by castor oil and extract of rhubarb on the 28th, the patient slept well; but next night he was kept wakeful by pain in the feet. This pain continued during November 30 and December 1, causing loss of sleep and slight delirium. His condition was improving on the 4th, when he was sent to division hospital.

CASE 5.—Private F. Lunt, Co. G, 19th Mass. Vols., was admitted Oct. 25, 1861, with remittent fever and neuralgia of the right side of the face. He complained much of cold feet and for some days of a faintness at the epigastrium. He was treated with three grains of quinine three times daily, but on November 9 Fowler's solution was substituted; purgatives were used to move the bowels. On the 10th he complained of headache, sore throat and coryza. On the 12th he fainted on two occasions when attempting to rise; the sounds of the heart were indistinct. Camphor and valerian were prescribed. The headache continued, and on the 13th the scalp was rubbed with tincture of aconite diluted with alcohol. On the 14th he had colicky pains and diarrhœa. The Fowler's solution was omitted on the 15th, four grains of quinine three times daily being substituted for it. On the 16th the patient fainted on rising to stool. The headache became somewhat lessened next day; three greenish stools were passed with much colicky pain. Four similar stools were recorded on the 18th. A ten-grain dose of calomel followed by castor oil caused frequent dejections, some being greenish in color and liquid. Opium was prescribed, but the colicky pains did not cease nor the blood disappear from the stools for several days. On the 27th headache was again com-

plained of, and as the bowels had become inactive, compound colocynth and blue-pills were given. A blister was applied to the back of the neck on the 30th. On December 3 there was pain and discomfort in the stomach with acid eructations, for which rhubarb and bicarbonate of soda were prescribed. Next day the patient was transferred to general hospital. [He was discharged on the 13th on account of neuralgia.]

Case 6.—Corporal J. C. Cronan, Co. G, 19th. Mass. Vols., took cold about Nov. 11, 1861, and had been constipated, without appetite and troubled with a cough since that time. He had taken purgative pills with effect. He was admitted on the 18th. Dover's powder was given. On the 19th the cough was urgent; the patient was deaf and had tinnitus but no headache nor epistaxis: the bowels were quiet and not tender but appetite was wanting. Small doses of tincture of opium, wine of antimony and chloroform were prescribed, with extract of valerian at night. Next day the teeth were covered with sordes and the tongue with a thin black fur. Fluid extract of senna was given. The patient had nausea on the 21st; the prescription of the 19th was omitted and quinine in three-grain doses substituted. This was omitted on the 23d, as it appeared to increase the nausea; nitrate of potash in fifteen-grain doses was given instead. The tongue became cleaner and the patient felt better on the 26th, but occasional purgatives were required for some time after this date. On the 30th he was able to sit up and his appetite was good. He was furloughed December 12.

Case 7.—Ephraim, a colored servant, was admitted Nov. 9, 1861. He had been troubled with a cough for two or three days, anorexia, headache and pain in the back and limbs. On admission the tongue was thickly white-coated, the pulse 90 and full; the headache had ceased but there was much thirst and restlessness at night. Nitrate of potash in fifteen-grain doses was given three times a day with Dover's powder at night. One loose dejection was passed on the 10th and another next day. Thirst was a prominent symptom; currant-jam with water was used as a drink. On the evening of the 11th the skin became hot and dry and the tongue dry, white in the centre and red on the edges. The patient was delirious during the night, and on the 12th was stupid; sordes appeared on the teeth; the pulse was 100 and feeble. Quinine in three-grain doses was given three times a day and a half ounce of brandy every two hours; the nitrate of potash was omitted. During the night he escaped in his delirium from the ward and returned to quarters. Next day he had epistaxis, and in the evening one involuntary bloody dejection. Small doses of carbonate of ammonia were given every two hours. Four loose and bloody stools were passed during the night of the 13th and three on the following day; the extremities were cold and there was some muscular trembling. The carbonate of ammonia was replaced by turpentine. On the 15th the stools were frequent, thin and mixed with blood-clots or consisting chiefly of blood, but the delirium was somewhat lessened. On the 16th he became quite rational towards morning; his pulse was scarcely perceptible at the wrist, extremities cold; stools frequent, scanty and bloody; tongue cleaner and more moist. He rallied well on the 17th, and next day his appetite was voracious; but on the 19th he had pain in the bowels, headache and furred tongue, and there was some mental wandering, especially at night. This condition persisted for a week, during which the bowels remained unmoved. On the 25th his back was found to be excoriated, but on the 30th the excoriations were reported as healing. His bowels continued confined and he did not rest well at night, but his appetite was excellent and his strength returning, when on December 4 he was sent to division hospital on account of the removal of the regimental camp from Poolesville to Muddy Branch, Va.

Case 8.—Private John Ross, Co. I, 19th Mass. Vols., was taken sick about Nov. 8, 1861, with chills, pains in the head and bowels and slight diarrhœa. On entering hospital on the 13th the patient was in a general perspiration; his tongue was red at the tip and edges and furred in the centre; he had no appetite, no epistaxis and no tinnitus; he said he usually felt better in the morning than at night. Quinine in five-grain doses was given three times a day. He had three or four dejections during the night, with pain in the bowels, but next morning felt very well. The diarrhœa was not restrained by Dover's powder or tincture of opium. On the night of the 16th involuntary watery discharges were passed, and during the 17th the patient slept most of the day, muttering dreamily. On the 18th his face was flushed, eyes suffused, tongue red and cracked; he groaned and talked in his sleep and was easily awakened; he had much headache, a short cough and pain in the umbilical region; the watery discharges persisted; the pulse was 96; skin hot and without any rose-colored spots. He had some nausea after taking an opiate on the 19th. He continued to sleep most of the time with his eyes half closed, moaning and muttering, but always rational when aroused. On the 23d he did not moan so much. On the 24th nausea and vomiting followed the use of quinine, which was thereupon suspended. In the course of a few days the diarrhœa became somewhat restrained, but the cough increased and was attended with much expectoration and some pain in the side; the tongue continued brown and cracked, the appetite failed and thirst increased. By December 2, however, he was able to sit up, and on the 13th he was returned to quarters.

Case 9.—Sergeant J. Q. A. Ferguson, Co. B, 19th Mass. Vols., was admitted Nov. 26, 1861. He had been unwell for a fortnight, during which he had lost strength, and more recently had become stupid and partially deaf. On admission his face was flushed, eyes suffused, skin hot and dry, tongue moist and slightly coated, lips parched, pulse 86; he had some cough and substernal pain. Small doses of opium and ipecacuanha were prescribed. On the 27th, as the bowels had not been moved for three days, fifteen grains of compound extract of colocynth were given; two dejections followed its use. The tongue became clean and the patient walked about a little; his appetite was good, but he did not rest well, his pulse was accelerated and his lips parched. On December 1 he was delirious and deaf; on the 3d he had epistaxis. In this condition he was transferred to division hospital on the 4th on account of the breaking up of the regimental camp. [His name does not appear on the register of deaths.]

Case 10.—Private Elias W. Phelps, Co. G, 19th Mass. Vols., was admitted Oct. 1, 1861, having been suffering for several days from fever, lassitude, want of appetite and pains in the head and bowels. On admission the patient was somewhat delirious, his pulse 96, tongue thickly covered with a dark fur and bowels unmoved for three days.

An ipecacuanha emetic was given. He was restless during the night, talking in his sleep and incoherent when awake. A purgative consisting of one blue-pill and one compound cathartic pill produced one free dejection; but in the evening the tongue was darker and the patient indifferent to everything when not specially addressed. On the 3d the delirium was increased, the stools involuntary, the pulse 120 and the tongue dry and dark. No rose-colored spots were discovered. Brandy was given at intervals. The diarrhœa and delirium continued; the teeth and lips became coated with sordes; the muscles twitched and the pulse increased in frequency while losing in strength until it became imperceptible. Death occurred October 5.

Case 11.—Private J. Fitzgerald, Co. I, 19th Mass. Vols., was admitted Nov. 1, 1861, with well marked remittent fever, for which three grains of quinine were given three times daily. He complained of not sleeping well at night. Valerian and Hoffmann's anodyne were prescribed for use at bedtime. On the 12th the tongue was thickly coated, the teeth covered with sordes, pulse 96 and feeble; one stool was passed during the previous twenty-four hours; the appetite continued fair. One stool was passed on the 13th, but there was no gurgling nor tenderness in the iliac region; one or two equivocal rose-spots were observed; the tongue was dry; the patient slept a little during the day and muttered in his sleep. Brandy and tincture of iron were prescribed. He was somewhat delirious during the 14th; his face livid, hands cold, tongue red at the tip and edges, respiration short and loud, pulse 96; on this morning he tried to support himself and fell; one stool was passed. On the 15th the patient was stupid, spoke with difficulty and had muscular twitchings; the bowels were quiet. Next day he was delirious; the tongue was black, dry and cracked, the pulse very feeble, and the bowels unmoved. Death took place on the 18th.

Case 12.—Private Edward Brailey, Co. D, 19th Mass. Vols., was admitted Oct. 11, 1861. He had been on picket duty on the banks of the Potomac and during the last two days had felt cold and feverish. He came to camp in a baggage wagon. His face was flushed, pulse 90, tongue covered with a thick white fur; he was restless at night and talked a good deal in his sleep. An emetic of ipecacuanha was given on admission and a Dover's powder at night. Next day the pulse was 96, skin hot, face flushed, eyes suffused, tongue dry and white, teeth covered with sordes, bowels moved twice, stools thin and watery. Sweet spirit of nitre was prescribed and quinine in two-grain doses three times a day. On the 13th the patient perspired a little at times and the skin of the abdomen showed some rose-colored spots; he had one passage and the abdomen was rather full, but there was no tenderness nor gurgling. Extract of valerian was given. Delirium came on gradually and continued until the 19th, when, after a good sleep, he awoke feeling better and more rational. During this period the bowels were rather constipated; the rose-colored spots were very thickly set and bright on the abdomen. He took port-wine and chicken-broth; brandy was rejected by the stomach. On the 20th he sat up in bed with aid to read a letter. After this his condition improved for some days, but the bowels remained unmoved and the tongue furred. An enema was given on the 23d, with castor oil in the evening and extract of senna on the following day; one alvine dejection was thus procured on the 25th, after eight days of torpidity. On the 26th the face was flushed, eyes suffused, pupils dilated, mouth dry and tongue covered with patches of thick white fur; headache was also present. Next day the tongue was clean but rather abnormally red in color; the patient complained of soreness from lying so long in bed. The bowels continued constipated, stools being obtained only at intervals of three or four days by the use of extract of senna, but about the middle of November four to six figs were eaten daily and under their use the bowels became more regular. On the 9th of this month complaint was made of tender feet, and this was continued until the 17th, when the tenderness diminished. He sat up for a short time on the 18th and during most of the day on the 19th. Beefsteak was now allowed in the dietary instead of the soups, broths and soda crackers to which he had been restricted up this time. He was furloughed December 12.

Case 13.—Private James Kelly, Co. D, 19th Mass. Vols., was admitted Dec. 13, 1861, having been sick for three or four days with slight cough, anorexia and pains in the head and limbs; his tongue was dry and brown in the centre, pulse 86, bowels constipated. Ten grains each of blue-mass and colocynth were given at night. On the morning of the 14th it was reported that the patient had groaned during most of the night; his face was flushed and breathing short. Next day diarrhœa, epistaxis and tinnitus aurium were recorded as present. Tannin in five-grain doses was prescribed three times daily. On the 19th the passages became involuntary. On the 20th the tongue was dark-colored, the teeth black with sordes, diarrhœa profuse, pulse 100, respiration short and mind wandering. No rose-colored spots were found on the skin. Turpentine was substituted for the tannin. [The case-book gives no further information, but on the register of deaths this man is reported as having died of typhoid fever Dec. 20, 1861, at the regimental hospital, Muddy Branch, Va.]

Fever cases from various records.—The following cases have been selected from the case-books of various hospitals and from the medical descriptive lists to further illustrate the character and consequences of the fevers which, although reported as typhoid, were probably in many instances more or less modified by the malarial influence.

Cases 1–5 are presented as specimens of a large class of records which give an account of the condition of the patient at some period, usually that of admission into hospital, but fail to carry out in detail the daily progress of the case. It is not difficult, however, to appreciate the course of such cases, especially when aided by a study of those which have been recorded in full; for, in addition to the result, there is given generally

some short statement as to progress, or, in the absence of this, some hint as to the patient's condition is conveyed by recorded changes in the medication or diet.

Case 1.—Sergeant Nahum L. Hayward, Co. F, 6th Conn.; age 30; was admitted from the field May 23, 1864, with typhoid fever. He was unable to give a satisfactory account of himself. He had headache, restlessness and anxiety of expression, incessant thirst and much diarrhœa; his tongue was dark, cracked and dry, pulse feeble and rapid, abdomen tympanitic and but slightly tender. The surface of the body was sponged with tepid water; cold was applied to the head and counter-irritation to the back of the neck; turpentine emulsion was given with milk-punch freely, beef-tea at short intervals and anodynes at night. The symptoms increased in violence; the patient became noisily delirious and died June 1.—*Hammond Hospital, Point Lookout, Md.*

Case 2.—Private David F. Farr, Co. E, 8th Me.; age 21; was admitted Aug. 17, 1864, having been sick since July 27 with typhoid fever. He was much prostrated, tongue furred and dry, conjunctivæ injected. Quinine with brandy-punch and turpentine emulsion was given. Diarrhœa supervened on the 18th, but was checked two days later. The turpentine was omitted on the 23d, the brandy on the 25th, the quinine on the 28th. The patient was able to sit up on the 27th. He was furloughed September 3 and returned to duty November 28.—*Satterlee Hospital, Philadelphia, Pa.*

Case 3.—Sergeant Edwin A. French, Co. B, 17th Pa. Cav., was admitted July 8, 1863, with typhoid fever. Countenance dusky; pain in back; abdomen slightly tympanitic; sudamina and tâches rouges; gurgling on pressure in right iliac fossa; pulse 90; tongue furred but moist; dry râles throughout chest; patient stupid. Gave Mindererus' spirit, quinia, beef-essence and milk-punch. 22d: Steadily improving, taking nine grains of quinine daily. August 1, convalescent. November 13, returned to duty.—*South street Hospital, Philadelphia, Pa.*

Case 4.—Sergeant Walter A. Brooks, Co. I, 53d Mass., admitted Aug. 16, 1863; mind dull; abdomen tympanitic and covered with sudamina and petechiæ, gurgling in right iliac fossa; tongue dry and fissured, protruded with difficulty; teeth covered with sordes; face suffused; subsultus tendinum; much delirium. Gave an ounce of sherry wine every hour; beef-tea freely. Died August 20.—*Union Hospital, Memphis, Tenn.*

Case 5.—Private Fabian Liszt, Co. C, 19th Pa. Cav.; age 22; was taken sick Aug. 10, 1863, a few weeks after enlistment, and was admitted on the 17th much exhausted, with brown furred tongue, hot and dry skin, pulse 120 and a diarrhœa of three or four stools daily. Dover's powder, neutral mixture and sweet spirit of nitre were prescribed. On the 20th the pulse was 100, the tongue moist and the bowels not so loose. Milk-punch was given. Small doses of blue-pill, opium and ipecacuanha were prescribed on the 22d, for which, on the 26th, neutral mixture was substituted. On September 10 full diet was allowed and small doses of quinine prescribed. He was returned to duty October 21.—*Turner's Lane Hospital, Philadelphia, Pa.*

In cases 6 and 7 the fever began to decline about the end of the second week; in case 8 it was prolonged for another week, apparently in connection with the intestinal lesion.

Case 6.—Private E. T. Ellsworth, Co. G, 16th N. Y.; age 19; was admitted Oct. 10, 1861, having been treated for three days before admission with astringents and nutrients. The attack commenced with a chill. On admission he had pain in the head, back and abdomen, a slow and feeble pulse, hot and dry skin, heavily coated white tongue with clean tip and slightly reddened edges, thirst, slight cough, somewhat labored respiration and scalding during micturition. Next day the characteristic eruption came out on the face and abdomen. His appetite was improved on the 12th; the tongue natural and the skin perspiring on the 13th. Two days later the skin became dry and hot, the tongue white at the base and red at the tip and margins, the pulse full, but there was no diarrhœa; next day the febrile action abated. On the 22d he was considered convalescent, and on November 1 he was returned to duty.—*Hospital, Alexandria, Va.*

Case 7.—Private Thomas J. Bitzer, Co. B, 1st Pa. Res., was admitted Sept. 3, 1862, with typhoid fever. On the 4th he had diarrhœa and profuse epistaxis. On the 6th the fever ran high; the pulse 120, full but compressible, the skin hot and dry, tongue moist and heavily coated, of a dirty brown color but red at the edges and tip; he had tympanites, mostly over the colon, anorexia, some headache and backache. Small doses of sweet spirit of nitre and fluid extract of ipecacuanha were given every hour and five grains of blue-pill with Dover's powder at bedtime. On the 7th the tongue was moister, the pulse full, slow and strong, the appetite better and no stool had been passed for two days; but on the forenoon of this day the fever returned and steadily increased; delirium, jactitation and tympanites over the small intestine were noted in the afternoon. Oil of turpentine and camphor-water were given every second hour, alternating with a diaphoretic mixture. In the evening the tongue became moist, the pulse soft, feeble and compressible and the skin bathed in perspiration. Next day there was retention of urine. A grain of quinine was given every hour and beef-tea and milk freely used. A few poorly defined rose-colored spots were found on the chest and abdomen on the 9th, and the right iliac fossa was tender and gurgled on pressure; the delirium increased in the afternoon of this day, but after a full dose of morphia and Hoffmann's anodyne the patient slept well, and next morning his appetite was better and there was an abundant crop of sudamina on the back and chest. On the 15th he was manifestly improving. On the 20th his appetite was excellent and the bowels had not been moved for five days. Powdered rhubarb in small and repeated doses was prescribed. He was returned to duty November 21.—*Hospital 16th and Filbert streets, Philadelphia, Pa.*

Case 8.—Private David Old, Co. A, 9th Iowa Cav.; age 17; was admitted March 22, 1864, with bronchitis, and became sick with typhoid fever on the 30th. The pulse was small, 105 to 110, the tongue furred; the patient was restless and had headache, giddiness, chilliness, an unpleasant taste in the mouth, no appetite, scanty urine and no diarrhœa. During the second week the pulse was strong, 118 to 122, skin warmer, tongue dry, red at the tip and

edges; there was also severe headache, with spinal and muscular pains and symptoms of pneumonia in the lower lobe of the right lung. After the tenth day minute rose-red spots appeared on the breast and abdomen, and there was some diarrhœa. During the third week the tongue was dry, brown and smooth, the teeth and gums covered with sordes, the lips dry, the skin hot and dry, the pulse 128 to 132; delirium, especially at night, deafness, pain in the right iliac region, tympanites, diarrhœa, disturbed sleep, anorexia and great thirst were present. In the fourth and fifth weeks the tongue was moister and cleaner, the pulse 90 to 86, the countenance brighter, the evacuations natural and the appetite improving. On May 2 the patient was sent to Keokuk, Iowa, as a convalescent.—*Lawson Hospital, St. Louis, Mo.*

Cases 9–17 illustrate the occurrence of intestinal hemorrhage, of perforation of the intestine and of complicating or sequent erysipelas, pneumonia and diarrhœa.

Case 9.—*Intestinal hemorrhage.*—Private Robert H. Howe, Co. B, 140th Pa.; age 22; was admitted from Harewood hospital, Washington, May 6, 1862, as a convalescent from typhoid fever. On the 10th he had hemorrhage from the bowels. Sulphate of quinine, tincture of iron and milk-punch were used in the treatment. Severe hemorrhage continued up to June 11. On July 18 he was much better. Medicine was omitted on the 31st. The patient was furloughed August 8 and returned to duty December 10.—*Satterlee Hospital, Philadelphia, Pa.*

Case 10.—*Violent diarrhœa and intestinal hemorrhage.*—Private David Jacoby, Co. C., 17th Pa. Cav.; age 24; was admitted July 7, 1863; he had been sick and under treatment in the hospital of his regiment since January for rheumatism. On admission he had fever, injected and watery eyes, epigastric tenderness, nausea and vomiting, eight stools in the twenty-four hours, abdominal pain and a thickly coated tongue, red at its edges. A poultice was applied; mercury with chalk and Dover's powder was prescribed every four hours, and acetate of ammonia with syrup of squill three times a day; beef-tea and wine-whey were also ordered. On the 11th the stools were occasionally bloody. A pill of acetate of lead and opium was given three times and oil of turpentine twice daily. The pain was relieved on the 12th and 13th, but returned on the 14th, with vomiting and dull headache; pulse 94. Subnitrate of bismuth was given. On the 15th the pulse was 110 and feeble; the vomiting had ceased, but the headache continued with tinnitus aurium and epistaxis. Opiate enemata were used in addition to the pills of lead and opium. On the 16th the stools became less frequent, but severe pain in the back and legs was reported. The diarrhœa became worse again next day. On the 20th the pulse was 115 and very weak; tongue dark and thickly coated; stomach irritable and the ejected matters bilious. On the 21st the patient was somewhat deaf and on the 22d delirious, with profuse diarrhœa, cold extremities and hemorrhage from the nose and mouth. The stools were involuntary and bloody on the 23d, and death occurred on the morning of the 24th.—*Mower Hospital, Philadelphia, Pa.*

Case 11.—*Perforation of the intestine.*—Private Thomas A. Watson, Co. C, 58th Pa.; age 37; was admitted Aug. 17, 1864, from Petersburg, Va., having been sick since July 29. He was very weak and much exhausted; tongue dry and thickly furred; subsultus tendinum. Quinia and aromatic sulphuric acid, with brandy-punches and turpentine emulsion were given. Next day he was seized with a severe pain in the abdomen, which became worse on the 19th; his pulse was thready; he picked at the bedclothes. He died on the morning of the 21st.—*Satterlee Hospital, Philadelphia, Pa.*

Case 12.—*Intercurrent erysipelas.*—Corp'l Daniel Austin, Co. G, 16th N. Y.; age 25; was taken about Aug. 7, 1861, with diarrhœa, which became worse and was accompanied by pain in the head, back and abdomen. He was admitted on the 22d as a case of gastro-enteritis. Next day his tongue was heavily coated in the centre but bright-red at the sides, teeth black with sordes, pulse 100, quick, bowels tympanitic but not tender, yielding frequent watery stools. In the evening the fever increased and the patient was at times delirious. On the 24th the eruption appeared on the face and abdomen; the tongue became dry and brown; the stools continued frequent. He was restless at night, and next day the tongue was fissured, abdomen prominent and mind disturbed. The eyes were fixed, the expression vacant on the 26th and the patient raved about Mount Vernon on the 27th, but became rational again on the 28th. On September 1 an erysipelatous blush appeared on the nose and extended over the cheek. Tincture of iron was given every three hours and the face painted with tincture of iodine. The swelling increased and by the 6th affected the hairy scalp; at this time there was some cerebral excitement. Wine and nourishment were given and the iodine reapplied. He was improved on the 13th and able to sit up on the 15th. Bed-sores were present on the right hip and on the sacrum. This patient was discharged May 31 because of disability from typhoid fever.—*Hospital, Alexandria, Va.*

Case 13.—*Intercurrent pneumonia.*—Private Michael Laly, Co. K, 2d Mich., was admitted Oct. 21, 1861, as a case of typhoid fever. This man had been sick with continued fever for six days prior to his admission, during which time he was treated with diaphoretics and tonics. On the 22d his pulse was 84, tongue dry and brown, skin hot and dry. Three five-grain doses of quinine were given with blue-mass and ipecacuanha. Next day the pulse was 80, the skin cool and the tongue moist. Four two-grain doses of quinine were given with Dover's powder at bedtime. There was a diarrhœa of two or three stools daily from the 24th to the 28th, and the tongue became dry and brown in the centre. On the 29th the pulse was 90 and quick, the tongue dry and tremulous, the skin hot; stupor, much delirium, frequent dry cough, some uneasiness on inspiration and crepitation in the lower part of the left side of the chest were among the symptoms recorded on this day. Calomel, ipecacuanha and quinine with turpentine emulsion and chlorate of potash were prescribed, and a blister applied to the left side. Next day there was cough with bloody sputa; the patient could be roused from his muttering delirium to answer questions, but he replied slowly and protruded his tongue with hesitation; the diarrhœa ceased during this attack. The cough became less frequent and the expectoration viscid and rusty on November 1. Wine was ordered four times daily. During the following night a profuse epistaxis occurred. The tongue became moist on the 3d and next day the expectoration was more abundant and the drowsiness lessened; pulse 76; respiration 24. A blister was applied to the front of the chest. On the 7th the cough was lessened, the expectoration mucous, the countenance bright, the bowels regular.

Milk diet was ordered with an ounce of brandy every four hours. He recovered January 10, 1862, and was returned to duty March 7.—*Hospital, Alexandria, Va.*

Case 14.—*Sequent pneumonia.*—Private James A. Evers, Co. C, 1st Del. Art.; age 18; was admitted Aug. 20, 1863, having been attacked with fever on board a transport from Alexandria to New York about the 18th. On admission the febrile action was marked, but the mind was clear and there was no diarrhœa, although the bowels were free; pulse 90. Profuse perspiration occurred on the 31st. No eruption was observed. On September 4 dulness and fine crepitation were marked over the right lung, and on the 6th two-thirds of the left lung was implicated. In the evening of this day the febrile action became heightened but free perspiration broke out towards morning; the expectoration was rust-colored, the tongue clean, pulse 86. On the 9th the condition of the patient had improved, although physical examination revealed no apparent change. By the 16th the area of dulness was much diminished and the expectoration free and without viscidity. Ten days later the patient was able to walk out, and on October 15 he was reported for duty.—*Central Park Hospital, N. Y. City.*

Case 15.—*Sequent diarrhœa from injudicious diet.*—Private Albert Hill, Co. I, 126th N. Y., was admitted Dec. 12, 1862, from Emory hospital, Washington, D. C., as a convalescent from typhoid fever. He was placed on full diet. On the 14th a diarrhœa of two to six stools daily set in and continued until the 21st. On Jan. 5, 1863, the diarrhœa recurred after eating apples. The patient was restricted to milk diet and the intestinal trouble ceased. Full diet was restored on the 12th; but on the 16th there was a recurrence of the diarrhœa, necessitating treatment until February 7. He was returned to duty March 4.—*Satterlee Hospital, Philadelphia, Pa.*

Case 16.—*Sequent diarrhœa and debility.*—Private Sylvester Chesebro, Co. K, 149th Pa.; age 23; was admitted June 18, 1863, from Stanton hospital, Washington, D. C., having suffered from typhoid fever since May 6. He was much emaciated and so debilitated that he was unable to stand without the aid of crutches: he had pain in the back, and his mouth and throat were slightly ulcerated. He was placed upon extra diet; a chlorate of potash gargle was prescribed. On June 20 the diarrhœa recurred with pain in the abdomen; but by the 26th this condition was relieved and the patient was evidently gaining strength. All medication was omitted and he was allowed full diet July 17. On the 28th he assumed light duties about the ward, and on August 18 was returned to duty with his command.—*Satterlee Hospital, Philadelphia, Pa.*

Case 17.—*Sequent diarrhœa and pulmonary affection.*—Private Clinton Dayton, Co. I, 17th Conn., a convalescent from typhoid fever, was admitted Dec. 16, 1862, with diarrhœa and shooting pains in the chest. Pills of lead and opium were given three times daily, and on the 21st the diarrhœa was restrained. Tincture of iron was then ordered, but the diarrhœa returned on the 26th. Small doses of an emulsion of castor oil, laudanum, mucilage and turpentine were prescribed. On the 30th the diarrhœa was controlled, but its recurrence with some abdominal pain, Jan. 12, 1863, called for opium twice a day. On the 14th ten grains of blue-pill were given; on the 18th the opium was omitted. Meanwhile, as the cough was troublesome, an expectorant mixture was ordered on the 15th, and croton oil applied to the chest from February 2 to the 6th. The expectorant was omitted on the 9th, but was renewed on the 17th and continued until the 22d. On March 27 he was placed on guard duty; he was furloughed April 1, and returned to his command June 28.—*Satterlee Hospital, Philadelphia, Pa.*

Cases 18–29 show debility, bed-sores, deafness, œdema, anasarca and morbid conditions of the lungs, liver and kidneys consequent on fever.

Case 18.—*Protracted debility.*—Private Samuel Watson, Co. K, 63d Ind.; age 39; was admitted April 6, 1865, debilitated from typhoid fever. [This man contracted typhoid fever in August, 1863, at Shephardsville, Ky.; he was admitted to hospital No. 1, Louisville, Ky., Jan. 26, 1864, with lumbago, and transferred to Madison, Ind., where his case was entered as chronic rheumatism; on March 23 he was assigned to Co. K, 19th Veteran Reserve Corps. He entered Judiciary Square hospital, Washington, D. C., April 9,—diagnosis: intermittent fever—and on the 26th was furloughed. He returned to Judiciary Square hospital March 23, 1865, and on April 6, as above stated, was transferred to Satterlee.] He was treated with quinine, iron, cod-liver oil and porter, and discharged from service May 26 on account of chronic pleurisy and protracted debility.—*Satterlee Hospital, Philadelphia, Pa.*

Case 19.—*Debility and phthisis.*—Private Charles McCormick, Co. D, 4th Mich.; age 20; was admitted Aug. 10, 1862, debilitated from typhoid fever. On December 9 he became affected with diarrhœa, which was checked by chalk, opium and catechu on the 17th. A few days later bronchitis was manifested. In February, 1863, there was dulness with sonorous râles over the apex of the left lung. He was discharged on the 28th on account of phthisis.—*Satterlee Hospital, Philadelphia, Pa.*

Case 20.—*Debility, deafness and bed-sores.*—Private John D. Magee, Co. D, 133d N. Y., had typhoid fever in June, 1861, followed by an enormous bed-sore involving all the supra-sacral tissues: he had not done any duty since the occurrence of this fever. He was admitted from Fairfax Seminary hospital, near Alexandria, Va., Dec. 16, 1862, and was placed on special diet with beef-essence and milk punch. His appetite was impaired, bowels irregular; he complained of pain about the joints and of a slight cough. He was treated with sinapisms and expectorant syrups. On Feb. 9, 1863, it was noted that the patient had become partially deaf in one ear. He was discharged March 27 because of general debility and partial deafness of the right ear following typhoid fever.—*Satterlee Hospital, Philadelphia, Pa.*

Case 21.—*Otorrhœa.*—Private H. Harpster, Co. K, 88th Ind.; age 21; while in hospital for an injury to his back, caused by a fall from a wagon, was taken with typhoid fever in April, 1863, and had a long and serious illness, during which he was much troubled with a purulent discharge from his ear. He was treated with turpentine emulsion, brandy and beef tea. When transferred to Camp Morton, June 9, he was improving rapidly and gaining in flesh.—*Hospital, Quincy, Ill.*

CASE 22.—*Debility, deafness and œdema of feet.*—Private Albert Friedlander, Co. D, 157th Pa.; age 23; was admitted Feb. 23, 1865, with anæmia, deafness and œdema of the feet, and was discharged by order of the A. G. O. dated May 3d. [This man had a severe attack of typhoid fever in January, 1865, and passed through the Fifth Army Corps hospital at City Point, Va., to Patterson Park hospital, Baltimore, Md., where he arrived February 8 and was entered as a case of pneumonia. On the 23d he was removed to Philadelphia.]—*Satterlee Hospital, Philadelphia, Pa.*

CASE 23.—*Swelling of lower extremity.*—Private David D. Cline, Co. I, 180th Ohio; age 31; was admitted March 24, 1865, his left leg being œdematous. He had an attack of typhoid fever in January, and during his convalescence the leg became swollen. Arsenic and compression by bandages failed to remove the tumefaction. He was discharged from service June 5.—*Tripler Hospital, Columbus, Ohio.*

CASE 24.—*Debility and œdema of lower extremities.*—Corporal Hugh McCrossen, Co. A, 118th Pa.; age 24; was admitted Oct. 25, 1863, with debility following typhoid fever; he had also some cough. On the 30th his legs became œdematous and continued in this condition until November 22, with variable appetite and occasional feverishness and cough. For some days, about the end of this month, he suffered from tympanitic distention of the abdomen. On December 6 there was much palpitation of the heart after exertion. On the 7th the cough continued and the œdema of the legs reappeared, but on the 8th there was an improvement which progressed steadily until the patient's transfer to the Invalid Corps. In his treatment quinine in small doses, citrate of iron and quinine, compound tincture of cinchona, wild cherry, squill, morphine, Dover's powder, cod-liver oil, milk-punch and porter were employed.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 25.—*Sequent diarrhœa and œdema of feet.*—Private John Vaus, Co. C, 82d Ill.; age 35; was admitted June 18, 1863, from Stanton hospital, Washington, D. C., as a convalescent from typhoid fever. He had been taken with the fever in March: diarrhœa followed, and about June 1 his feet began to swell. He was placed on quinine and tincture of iron in small doses, and due attention was paid to his diet; but the diarrhœa recurring, pills of Dover's powder and sulphate of iron, and afterwards turpentine in mucilage, were tried. Medication was continued to August 1, and the patient was returned to duty on the 26th.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 26.—*Sequent diarrhœa and anasarca.*—Private Robert H. Davis, Co. A, 78th Ill.; age 27: was admitted Sept. 16, 1864, having suffered from a severe attack of typhoid fever June 16, 1863, followed by a persisting diarrhœa. On admission he had ascites and œdematous legs. He was discharged as wholly disabled December 8, 1864.—*Hospital, Quincy, Ill.*

CASE 27.—*Enlargement of liver and ascites.*—Private Henry C. Packard, Co. E, 6th Vt., was admitted Aug. 10, 1862, with typhoid fever. On October 3 the left lobe of the liver was enlarged and the patient affected with ascites. Nitro-muriatic acid and saline cathartics were used in the treatment. His appetite became very good, but otherwise there was little improvement. He was discharged December 29 because of enlargement of the left lobe of the liver, with ascites.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 28.—*Inflammation of liver and probable abscess discharging into colon.*—Private Benjamin M. Richardson, Co. C, 93d N. Y.; age 24; was admitted Dec. 15, 1862. Diagnosis—diarrhœa. [He had contracted diarrhœa at Williamsburg, Va., in May. This lasted ten days, after which he was confined to bed for four weeks with typhoid fever: during convalescence he was much troubled with pain referred to the liver and stomach.] By January 12, 1863, the diarrhœa was checked, but the skin became yellowish and on the 19th jaundice was well marked and the liver enlarged. Small doses of mercurials were given. Diarrhœa recurred on February 1, but was quieted on the 6th by the use of krameria and paregoric. After this the stools became clay-colored, and on the 9th pain was developed in the right hypochondrium, which became so acute on the 15th that the poulticing which had been employed was discarded and a blister applied with relief to the patient for a day or two. On the 21st the pain returned and on the 24th a sharp diarrhœa set in, yielding from two to eleven stools daily until the 28th. After this he improved under the use of quinine, carbonate of iron and nitro-muriatic acid. He was placed on hospital guard April 1, and was returned to his command August 27.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 29.—*Disease of the kidney.*—Private Thomas Buckley, Co. D, 6th Conn.; age 21; stated that he had never been intemperate in the use of liquors and was perfectly healthy before enlistment. In September, 1863, he had had typhoid fever and was sent to general hospital at Hilton Head, S. C. Two months elapsed before convalescence was established. A week after his return to duty he was admitted to the regimental hospital with œdema of the lower extremities. In about a month he was furloughed to his home, where he remained until his admission into this hospital, April 19, 1864. His face was puffy and pallid, his feet and legs œdematous: the urine was albuminous and contained granular casts. He was discharged from service August 12.—*Central Park Hospital, N. Y.*

Cases 30–50 illustrate the occurrence of inflammatory processes in various parts of the body, but especially in the lower extremities and parotid glands.

CASE 30.—*Muscular pains.*—Corporal Emanuel Davis, Co. K, 137th N. Y.; age 36: was admitted June 20, 1863, convalescing from typhoid fever which had disabled him since March 10. On admission he was troubled with subacute muscular pains affecting the left arm and leg and sometimes the right thigh. These pains were not continuous, but came on at intervals without premonitory symptoms or accompanying fever and lasted about twelve hours. Dampness and cold appeared to act as exciting causes. The joints, large and small, were also occasionally affected. The pains were increased by motion and relieved by pressure; the warmth of bed aggravated them. The patient was much debilitated, emaciated and low spirited. He was treated at first with a pill containing one-half grain each of powdered iron and extract of nux vomica and one-sixth of a grain each of quinia and strichnia, given three times a day, with a liniment of ammonia, soap and chloroform; but after a few days the pills were omitted and a teaspoonful of a mixture consisting of one drachm of iodide of potassium, one fluid drachm of colchicum wine and

two ounces of compound tincture of gentian was prescribed instead. Two weeks after this treatment was instituted the patient began to improve, and on August 11 he was returned to duty.—*Act. Ass't Surg. Otto Rœhrig, U. S. A., Satterlee Hospital, Philadelphia, Pa.*

Case 31.—*Rheumatic pains.*—Corporal Dudley S. Cutler, Co. F, 83d Pa.; age 20; was received June 12, 1863, from Lincoln hospital, Washington, D. C. [He had been treated for typhoid fever in regimental hospital until April 20, when he was transferred to Lincoln hospital.] On admission he complained of a dull heavy pain in the left hip and leg and seemed to have lost a good deal of flesh. Cups, blisters and liniments were employed with turpentine emulsion internally. [On August 1 he was removed to Sixteenth and Filbert streets hospital, Philadelphia, Pa. Diagnosis—chronic rheumatism. He was transferred to the 1st Battalion, V. R. C., September 23.]—*Satterlee Hospital, Philadelphia, Pa.*

Case 32.—*Pain and swelling of feet.*—Private Peter Gates, Co. E, 1st Mich.; age 25; was admitted March 2, 1862. This man became affected with intermittent fever in November, 1861, and continued in ill health from that time. From the daily entries on the hospital record which cover the period to March 29, it is found that the case was regarded as one of typhoid fever, and that the patient was unable to walk, having a bed-sore on each hip and much swelling, tenderness and pain in his feet, but his tongue was moist and clean, appetite good, bowels regular, skin natural and pulse of fair strength. Stimulants and citrate of iron and quinine were given, but for some time there was no improvement in the condition of the feet. Severe frontal headache was noted as having been present on the 10th and 11th and as having recurred on the 15th, 20th and 29th. Quinine was prescribed on the 15th. At the time the last entry was made the bed-sores were healing and the swelling of the feet had subsided. The patient was discharged from service May 3.—*Seminary Hospital, Georgetown, D. C.*

Case 33.—*Pain in foot and leg.*—Private William Camp, Co. D, 122d Ohio; age 19; was admitted Sept. 11, 1863. Diagnosis—intermittent fever. He had been sick for five days, during which the bowels were constipated. Three compound cathartic pills given on admission produced two copious stools at night. On the 12th the pulse was 90, full and strong, tongue coated, appetite deficient, skin hot and moist and urine scanty; there was pain in the head, limbs and back. Sweet spirit of nitre was prescribed. By the 15th the skin had become cooler and the headache diminished; epistaxis occurred twice on this day. Diarrhœa set in on the 16th, the stools being liquid and yellowish and the tongue dry and coated. Drowsiness and delirium were developed on the 18th and recurred particularly at night; the pulse ran up to 110 and the respiration to 32. Milk-punch was given and a blister applied to the chest; squill and seneka were also prescribed. The diarrhœa meanwhile persisted, and on the 22d three involuntary stools were passed. Subnitrate of bismuth was given. The patient rested well on the 27th, and next day was more rational; the chest symptoms also were much improved. The diarrhœa continued at the rate of three to five stools daily, with sometimes severe pain in the bowels, until October 16, and during this period the tongue was more or less coated and sometimes dry and the appetite poor. Wine, brandy, porter, milk-punch, wine-whey and whiskey with quinine were used. The appetite returned on the 23d, but the diarrhœa recurred on the 26th and again on November 17, its appearance on the latter date having been attributed to the use of apple-sauce. About October 1 the foot (side not stated) became very painful, but no further mention is made of this until November 13, when the leg was reported as much swollen, and hop fomentations were prescribed. On the 25th the left leg and foot were swollen and fomentations of pepper and hops were used. On the 27th chloroform, arnica and aconite were mixed with olive oil as a liniment for the left leg and foot, but after this no more information is given concerning their condition. The patient was furloughed Jan. 25, 1864. He returned February 24, and was sent to his command for duty May 3.—*Third Division Hospital, Alexandria, Va.*

Case 34.—*Scorbutic complication; pain in feet and legs; boils.*—Private J. H. Penny, Co. A, 1st S. C.; prisoner of war; age 19; was admitted Nov. 10, 1863, as a case of continued fever. The tongue was red, streaked with white, the gums pale and swollen, the pulse frequent; he was very weak and had much pain in the limbs. On the 14th the bowels were moved five times and the tongue was dry, red and brown; nevertheless he began to improve from this date, so that by the 21st the tongue was moist and cleaning and the bowels regular. On the 27th the patient's condition continued favorable, but he had a troublesome bed-sore. On December 20 he remained weak and emaciated and had large unhealthy boils on various parts of the body which appeared in successive crops until January 6, 1864, when the last boil ceased to discharge. He also at this time suffered great pain in his feet and legs, which were swollen and cold; this was considered due to the severity of the weather. After January 9 this pain ceased and he steadily improved until April 27, when his exchange was effected.—*Act. Ass't Surg. W. A. Harvey, U. S. A., Hammond Hospital, Point Lookout, Md.*

Case 35.—*Superficial abscesses.*—Private William Dundass, Co. C, 11th N. J.; age 25; was admitted from Summit House hospital, Philadelphia, Aug. 18, 1864, as a convalescent from typhoid fever, suffering from diarrhœa and abscesses in the right hypochondrium and over the epigastrium; his fever dated from June 10. Not until December 1 was the diarrhœa checked, by which time the abscesses were healed and the general health much improved. He was then placed on full diet with cod-liver oil, iron and quinine. On Feb. 16, 1865, he began to do guard duty, and on May 20 was discharged by order of A. G. O., dated May 3.—*Satterlee Hospital, Philadelphia, Pa.*

Case 36.—*Abscess and contraction of leg.*—Private Aaron Chubbuck, Co. C, 2d Pa. Heavy Art.; age 18; was admitted Aug. 12, 1864, convalescing from a tedious attack of typhoid fever [regarded as remittent during the patient's stay at Harewood hospital, Washington, D. C.], which had left him with abscesses in the left thigh near the buttock. The leg was partially flexed and could not be extended without much pain. Iron and quinine were administered with full diet; pressure was applied to the leg from December 3 to January 5, 1865. On the 15th the leg was reported as much contracted, discharging and so painful as to be unable to bear extension on splints. On February 4 another abscess was reported as forming; this discharged on the 20th. On March 23 the patient suffered from a

slight attack of varioloid. On June 20 he was discharged from service on account of lameness of the left leg.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 37.—*Ulceration of toes.*—Private Israel J. Gromoble, Co. I, 148th Pa.; age 18; was admitted Sept. 23, 1863, from Finley hospital, Washington, D. C., as a convalescent from typhoid fever. On the 26th four of the patient's toes were found to be ulcerated and much congested. Incisions were made around the ulcers and warm-water dressings prescribed, with tincture of iron internally, porter and extra diet; a wash containing sugar of lead and opium and an alcohol and water lotion were subsequently employed. On October 18 the ulcers were granulating. All treatment was omitted on the 25th, and on November 16 the patient was returned to duty.—*Mower Hospital, Philadelphia, Pa.*

CASE 38.—*Ulceration of leg.*—Private James A. Humes, Co. H, 150th Pa.; age 20; was admitted Dec. 12, 1862, from Carver hospital, Washington, D. C., as a convalescent from typhoid fever. He was weak and emaciated and had slight tenderness in the right iliac region. Nux vomica in compound tincture of gentian was ordered. On Feb. 10, 1863, he had fever-sores on the leg, which were treated first with flaxseed poultice and afterwards with oakum dressing. On the 27th the patient's hair was falling out. On March 4 the nux vomica was omitted. A lotion of sulphate of zinc was applied on the 20th and pills of carbonate of iron and quinine were given three times a day, under which treatment the ulcers healed. On April 17 all medication was omitted and the patient was put on light duty. He was returned to his command June 28.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 39.—*Sloughing of cornea.*—Private William A. Chase, Co. F, 161st N. Y., was left under the care of a nurse in regimental hospital on the departure of his command. He had been sick for several weeks and was believed to be dying. He was exceedingly emaciated and had delirium, diarrhœa, dry tongue, blackened with sordes, cough and jerking respiration. He was admitted Dec. 4, 1862, for better attendance and treatment. He was not removed from bed during the transfer, but was carried by relays of men, and was well protected from the cold by blankets, hot bottles and whiskey toddy. He was extremely weak but was restless and picked at the bedclothes; his breath was very offensive. The left cornea sloughed with escape of the contents of the anterior chamber, but the case progressed without much suffering and a cicatricial staphyloma was formed. On Jan. 9, 1863, he was fairly convalescent, and on March 16 was discharged from service on account of debility and loss of vision of the left eye.—*Elmira Hospital, N.Y.*

CASE 40.—*Superficial gangrenous patches.*—Corp'l J. H. Kourtz, Co. C, 130th Pa.; age 19; was admitted April 20, 1863, having been sick since the 1st. He was considerably emaciated and in bad nervous condition; his pulse 90, appetite poor, tongue white-coated, dry and cracked, and bowels moved five or six times during the twenty-four hours; he had a slight cough with thin gray sputa mixed with semi-solid masses of a dark-brown color, and there was dulness and slight crepitus in the right infraclavicular region. Suitable nourishment was ordered with sweet spirit of nitre and Dover's powder at bedtime. On the 24th two small pustules with inflammatory areolæ were observed above the left knee. A two-grain dose of quinine in sherry was given every two hours. By the 29th the centre of these spots had become gangrenous and evolved a very offensive odor; a similar but larger spot had also developed on the right forearm three inches above the wrist. Chloride of zinc solution was used locally. The spots enlarged slowly, and on May 3 a pustule with a large inflammatory base appeared on the mucous membrane of the left side of the lower lip. On the 5th there was low delirium; the left side of the face was swollen and the gangrenous spot on the lip was as large as a penny and increasing rapidly; the diarrhœa meanwhile continued. The patient became unconscious and died on the 8th.—*Act. Ass't Surg. O. P. Sweet, U. S. A., Lincoln Hospital, Washington, D. C.*

CASE 41.—*Gangrene of toes.*—Private William Wollcott, Co. H, 12th N. Y.; age 53; was admitted June 23, 1863, from Harewood hospital, Washington, D. C. [The records show that this man had typhoid fever at White Oak Church, Va., in March, and that he was received into Harewood hospital, April 21, whence he was transferred to Satterlee hospital, Philadelphia, Pa., as stated.] On admission he was found to have a diarrhœa causing four or five stools daily, and a gangrene, attributed to frost-bite while on picket, involving four of the smaller toes of the right foot and two of those of the left foot; he had also an ulceration of the left buttock which was supposed to have resulted from riding in ambulance wagons. On the 27th the sphacelated parts of the right toes separated leaving clean ulcers, and on July 4 the first joints of the second and third toes of the left foot were removed by operation. Water dressing was applied. On the 29th the patient was furloughed. On September 4 he was transferred to the Invalid Corps.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 42.—*Gangrene of leg.*—Private E. D. Ellis, Co. H, 2d Vt.; age 20; was admitted June 29, 1862, with chronic bronchitis following typhoid fever. The patient, although lightly built and not very robust, had always enjoyed good health until attacked by typhoid fever on the Yorktown peninsula, where he remained in hospital until conveyed to this place. While on board the transport he noticed a pimple on the outer side of his left leg about two and a half inches above the ankle. As it did not create annoyance at that time the attention of the attending surgeon was not called to it until about a week after his admission. It was then painful and presented the appearance of an ordinary boil which had broken; warm fomentations were applied. In a day or two the edges began to slough, but under the influence of good diet and tonics, with the continuance of warm applications, the slough separated with but little loss of tissue, leaving a healthy ulcer. Granulation proceeded kindly and cicatrization was nearly completed when the surrounding tissues became red, swollen and painful. The general treatment was not changed, but a bread-and-water poultice was applied to the sore with much relief to the patient. The ulcer remained for a time quiescent, but thereafter the edges again took on violent inflammation and became gangrenous. Nitric acid was freely applied to the whole surface, but the processes of separation and granulation were carried on slowly. Gradually, however, the patient improved; his cough subsided; he gained flesh and became able to take exercise in the open air. Towards the end of December the ulcer was quite small and looked well; but at this time the patient partook freely of liquor while absent on pass, and, perhaps as a result of unnoticed

violence, the gangrene reappeared and spread more rapidly than before. Caustic potash was applied, but the slough began to spread, involving the skin, fascia, muscles, tendons and even the bone. The general health became much impaired; the stomach loathed food and rejected whatever was taken into it; opiates, even in large doses, were insufficient to induce sleep, so that the patient rapidly lost flesh and became exceedingly irritable. To the whole gangrenous surface sulphate of zinc was freely applied and carefully retained in position by dry lint and strips of adhesive plaster; for an hour, or a little more, there was an increased aching in the parts, but comparative ease followed. In twelve hours a poultice of slippery elm was applied. Next day the slough began to soften, free suppuration took place and the patient's appetite and sleep improved. In a week nearly all the slough had separated and the granulations were progressing satisfactorily. The lower edge of the deeper portions of the ulcer still looked suspicious and required a re-application of the zinc sulphate, diluted, however, on this occasion by the addition of an equal part of powdered gum arabic. The result was beneficial, and at the date of the report the whole ulcer was filled with healthy granulations.*—*Satterlee Hospital, Philadelphia, Pa.*

Cases 43–50.—*Disorganization of the parotid gland.*—Case 43.—Private Edward J. Wilson, Co. I, 138th Ill.; age 18; was admitted Oct. 1, 1864, with typhoid fever. He had high fever, dry skin, brown and dry tongue, sordes, anorexia, occipital pain, mental dulness, epistaxis, yellow watery stools seven or eight times a day and tympanites and tenderness of the abdomen. Dover's powder, quinine and calomel were given every four hours, and the skin was sponged three times a day with alkaline water. On the 11th the skin and tongue had become moist, the diarrhœa lessened and the appetite better, but the left parotid gland was swollen and painful. On the 14th the patient was delirious and refused food. On the 15th there was much dysphagia and the radial pulse was hardly perceptible. He died on the 18th.—*Hospital, Quincy, Ill.*

Case 44.—Private B. F. Ross, Co. G, 78th Ill., was admitted Sept. 19, 1862. A severe diarrhœa complicated this febrile case. The patient had, moreover, recovered from an attack of mumps only a short time before his admission. Two or three weeks after admission and while under treatment for the fever the parotid of the left side, which had been most affected during the previous attack of mumps, became painful and swollen, increasing gradually to an immense size and remaining for some time very hard and resisting. When it had softened under continuous poulticing it was lanced in several places, and again after a few days more, without other issue than a few drops of dark-colored blood. After this the tumor began to discharge through the ear and then through the openings made with the lancet, the whole of the gland finally suppurating. Meanwhile a harassing cough set in and the diarrhœa could not be controlled. The patient died October 29.—*Hospital No. 1, Quincy, Ill.*

Case 45.—Private James E. Taylor, Co. A, 111th N. Y.; age 18; was admitted Jan. 8, 1862, with an abscess of the parotid gland following an attack of typhoid fever. He was much emaciated. As the abscess discharged from the auditory meatus, an incision was made below the ear to give exit to the pus. Nutrients, tonics and stimulants were employed, but the patient died on the 21st.—*Third Division Hospital, Alexandria, Va.*

Case 46.—Private John Kinnison, 48th Ind., a nurse, was placed on sick report July 13, 1863, on account of an attack of duodenitis, with hepatic complications, supervening upon a diarrhœa of two weeks' standing. Rest in bed, mild nourishment and Dover's powder were prescribed. During the next five days the bowels improved and pain on pressure ceased, but after this the left parotid became painful and swollen. There was severe dysphagia on the 19th. An abscess at the angle of the jaw was opened on the 24th and discharged freely; there was also a copious discharge from the external auditory meatus. Iron, quinine, opium, strong wine and good diet were employed. On August 20 he was furloughed.—*Union Hospital, Memphis, Tenn.*

Case 47.—Private Abram W. Pearl, Co. H, 9th N. H.; age 45; was admitted Dec. 11, 1862, from Carver hospital, Washington, D. C., where he had been treated for typhoid fever since October. He had parotitis of the right side. Simple cerate was applied. On Jan. 30, 1863, he had some diarrhœa. He was placed on guard duty February 7, but three days later returned to the ward on account of severe pain in his feet. On the 13th he had some vertigo and on the 16th a recurrence of diarrhœa, which was not checked until the 26th. The pain in the feet continued until April 10. Shortly after this he was placed on duty in the kitchen and was not returned for field service until September 26.—*Satterlee Hospital, Philadelphia, Pa.*

Case 48.—Private Robert Powell, Co. D, 10th Ill. Cav., was admitted Sept. 10, 1863, much emaciated and very weak from fever and diarrhœa; he could scarcely speak. He had a freely suppurating parotid abscess which opened externally and also into the external auditory canal. He died on the 21st.—*Union Hospital, Memphis, Tenn.*

Case 49.—Private William Lyons, Co. B, 34th Ohio; age 17; robust and athletic; was admitted Aug. 11, 1864, having had diarrhœa for several days, causing five or six liquid stools daily. Astringents were employed, and next day he had but one stool, but the abdomen was tender, the skin hot and dry, the tongue moist and very glossy and the appetite lost; there was also some faintness. Quinine, iron and whiskey were prescribed. The bowels remained

* Act. Ass't. Surg. Lloyd Dorsey, *U. S. A., Med. and Surg. Reporter*, Philadelphia, Vol. X, 1863, p. 385, in a series of clinical notes gives the history of a case reported as scurvy with mortification of the left foot. The case had a decidedly febrile character throughout. The patient, B. W., Co. G, 33d Mass. Vols., age 17; was admitted to Harewood hospital Nov. 19, 1862, with an intermittent affection of two months' standing. Treatment entirely relieved his ailment when, on December 7, he was taken with debility, diarrhœa and febrile symptoms. On the morning of the 9th there was great delirium; the pulse 120, weak and irregular; the skin hot and dry; the tongue dry, [illegible] coated with sordes. Turpentine enemas, quinine, wine and beef-tea were prescribed. During the two following days the symptoms showed little change. On the 12th the fever was subsiding and the delirium lessened, but both feet were greatly swollen, painful and covered with blisters of various sizes, while the legs were ecchymosed and the hands purplish; there was no hemorrhage from the mucous membranes and, aside from an excessive odor, nothing peculiar was noticed in the stools. After a few days the feet became less tumid, the vesications collapsed and the ecchymoses faded somewhat; but on the 21st the left foot began to slough and this morbid action continued to the close of the case. Meanwhile blotches appeared on the surface of the body, the pulse became feeble, the stools involuntary, and delirium recurred, ending this time in stupor. Death took place Jan. 3, 1863.

quiet, but on the 19th two stools were obtained, castor oil and turpentine having been given on the previous day. On the 21st the pulse was 116, tongue moist and with a slimy white coat, skin hot and dry, appetite deficient and stomach irritable, bowels moved five times; rose-colored spots appeared on the abdomen; rough and sibilant râles were heard in the upper lobes of the lungs. Turpentine, squill and ipecacuanha were given, with warm bricks to the feet, a blister to the chest and sinapisms to the epigastrium. On the 23d sordes appeared on the teeth and there was frequent epistaxis; the abdomen was tympanitic and covered with dark spots; the mind so dull that questions were answered with reluctance and indistinctly; both parotids were inflamed and painful. The patient was very restless and delirious on the 25th; his pulse was 132 and he was evidently sinking rapidly. He died on the morning of the 26th.—*Cumberland Hospital, Md.*

Case 50.—Private Melvin Brown, Co. G, 23d Ohio; age 18; was admitted Oct. 17, 1864, having been sick for four months. He was much emaciated and unable to walk; he had no appetite; his abdomen was tympanitic and tender, bowels loose, tongue smooth, dry and shining, lips dry and parched, skin dry and hot, pulse 112. Quinine, iron, Dover's powder, beef-essence and stimulants were ordered, and glycerine applied to the tongue and lips. On the 22d crepitus was heard over the middle parts of both lungs. On the 24th epistaxis recurred about every two hours and the parotid glands began to swell. The submaxillary glands became involved on the 27th. Pus was discharged from the left ear on the 29th. Nevertheless the patient rested well at night, had some appetite and was hopeful. Carbonate of ammonia was given on account of the cough. Pus was discharged from the right ear on the 31st and the eye of that side was closed by the increasing swelling. Next day there was a bed-sore on the sacrum. The pulse became very weak and almost imperceptible. He died November 5.—*Cumberland Hospital, Md.*

Injury to the nervous system is suggested on more or less definite testimony by the eleven cases numbered 51–61.

Case 51.—*Œdema and partial paralysis of right leg.*—Private Ernest Bowman, Co. B, 9th Pa. Res.; age 20; was taken sick at Harrison's Landing with typhoid fever, July 18, 1862, but when admitted, August 10, was so far recovered as to have no fever and but little diarrhœa. Shortly after admission his right leg became painful and swollen from œdema. In two weeks the swelling disappeared, but a partial paralysis remained for a considerable period.—*Satterlee Hospital, Philadelphia, Pa.*

Case 52.—*Partial paraplegia.*—Private Richard H. Martin, Co. D, 16th Maine; age 28; was admitted May 28, 1864, as a convalescent from typhoid fever. [About Dec. 15, 1863, while near Culpeper, Va., he was taken with fever and delirium and became very weak; he was treated in the field division hospital and transferred Feb. 1, 1864, to Stanton hospital, Washington, D. C.] On admission his health was impaired and his lower extremities partially paralyzed; he could walk, but slowly and unsteadily. He was discharged August 15 because of this disability.—*Turner's Lane Hospital, Philadelphia, Pa.*

Case 53.—*Paraplegia with atrophy of right leg.*—Private Chauncey Brown, Co. B, 97th N. Y., was admitted Sept. 3, 1862, as a convalescent from typhoid fever. He was much emaciated and debilitated and had a large bed-sore over the sacrum, severe pain in the back and paralysis of the lower limbs. By November 15 he could go about a little on crutches, for which, on December 4, he was able to substitute a cane, the bed-sore having healed, though there still remained some tenderness and wasting of the right leg. He was returned to duty on the 26th.—*South Street Hospital, Philadelphia, Pa.*

Case 54.—*Paraplegia.*—Corporal John McGinnis, Co. C, 42d N. Y., was admitted Aug. 7, 1862, as a convalescent from typho-malarial fever contracted on the Peninsula. He did well under tonic treatment till September 30. Loss of power and sensation in the lower limbs gradually increased to an almost total paralysis. During the winter iodide of potassium and strychnia were given and the galvanic battery applied. The patient improved very much, but as he was unable to do duty he was discharged March 20, 1863.—*South Street Hospital, Philadelphia, Pa.*

Case 55.—*Partial hemiplegia with contraction of right leg.*—Private William Criswell, Co. I, 12th Ky.; age 30; was admitted March 3, 1863, with some diarrhœa, a bad cough, pain in the back and partial hemiplegia. He suffered from typhoid fever in November, 1862, and had never fully recovered from the consequences of the attack. Cups were applied to the back and strychnia and capsicum administered. He improved rapidly, but continued lame in his right leg, which was somewhat contracted at the time of his transfer to Louisville, Ky., June 9.—*Hospital, Quincy, Ill.*

Case 56.—*Hemiplegia.*—Private Nathan Smith, Co. M, 1st Wis. Cav.; age 34; was admitted Dec. 8, 1864, suffering from paralysis of the left side, which, according to the statement of the patient, was the result of an attack of typhoid fever. He was treated with one-fifteenth of a grain of strychnia and two-thirds of a grain of capsicum three times a day, but there was no improvement in his condition at the time of his discharge, April 8, 1865.—*Act. Ass't Surg. D. Lewis, U. S. A., Hospital, Quincy, Ill.*

Case 57.—*Hemiplegia.*—Private Gilbert Leonard, Co. D, 27th N. Y., was admitted Oct. 30, 1861, having been sick for several weeks with typhoid fever. He had some diarrhœa and cough on admission, but the respiration was natural. On the evening of November 4 the respiration became increased to 26, the tongue dry, the pulse accelerated, and crepitation was detected in the lower part of the right lung. The sputa became streaked with blood on the 5th and rusty on the 6th. On the 9th the patient was very weak and swallowed with difficulty: he was scarcely able to expectorate: he slept with his eyes half open and was unable to speak. He was stronger on the 11th and his bowels were quiet, but the right side of the body was paralyzed. On the 12th he was much stronger and asked for food; his countenance was bright, tongue nearly clean and bowels regular. He gradually rallied from this low condition but the paralysis continued. Strychnia was given on December 1. On Jan. 1, 1862, he was able to walk with a cane; sensation in the arm was much improved but motion was impossible. He was discharged for disability on February 18.—*Hospital, Alexandria, Va.*

CASE 58.—*Paralysis of right arm and left leg, with atrophy of the latter.*—Private James Williamson, Co. G, 109th Pa.; age 18; was admitted April 24, 1865, as a convalescent from typhoid fever. [He was taken sick Sept. 2, 1864, at Camp Taylor, Arlington Heights, and treated in Augur hospital, near Alexandria, Va., for two months. He was unconscious for two weeks, during which he lost the power of moving his right arm and left leg. He was afterwards transferred successively to the Lincoln, Cuyler and Turner's Lane hospitals.] On admission his general health was good and he had recovered the use of his arm, but he could not flex the left foot; the left calf was atrophied to the extent of two inches and a half and there was some atrophy of the thigh. He was transferred May 10 to McClellan hospital, Philadelphia [whence he was removed to Mower hospital on July 20 and to Harrisburg for muster out on September 15].—*Turner's Lane Hospital, Philadelphia, Pa.*

CASE 59.—*Paralysis agitans.*—Private Thomas Dunlap, Co. K, 68th Pa.; age 23; was perfectly healthy before enlistment, and, so far as could be ascertained, had no hereditary predisposition to disease. He was admitted Dec. 12, 1862, as a convalescent from typhoid fever, much debilitated and with a constant trembling of the whole body. Under treatment by quinine and iron, beef-essence, milk-punch, oysters and eggs he increased in strength, but the paralysis agitans continued undiminished. He was discharged Feb. 11, 1863, on account of paralysis agitans and general debility supervening on typhoid fever.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 60.—*Sequent cerebro-spinal fever.*—Private Arthur Potter, Co. M, 1st N. J. Cav.; age 19; was admitted Aug. 20, 1864, with severe uncomplicated typhoid fever, from which he convalesced rapidly. By September 23 he was walking about the ward; but on October 15 he was seized with headache, fever and constipation. Castor oil and turpentine were given and the urine withdrawn by catheter. He became semi-comatose on the 17th and died comatose next day.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 61.—*Inflammation of spinal cord with paraplegia.*—Private William J. Pool, Co. A, 126th N. Y.; age 23; admitted Dec. 12, 1862, as a convalescent from typhoid fever. He was much emaciated, pale, greatly prostrated, but without apparent organic lesion; he had little appetite and slept badly, but under the use of quinine and compound tincture of cinchona, with generous diet and porter, his general health and strength after a little while began to improve. In about two weeks he expressed himself as feeling much better, but complained of great weakness of the legs, which gave way under him when he attempted to stand. Regarding this as a local expression of general debility, extract of nux vomica was given in quarter-grain doses three times daily; but this medicine was soon discovered to be injurious and its use was suspended. It was found that even when in bed the patient had very little power over his lower extremities, for when raised by the hand of an assistant they would fall by their own weight when the support of the hand was removed. The sensibility of the skin, as tested by pressure and pinching, was found to be remarkably deficient, but pressure in the lumbar region of the spine revealed great tenderness. These symptoms, with the experience furnished by the use of the nux vomica, were believed to indicate an inflammatory condition of the cord or its membranes, and the case was treated in accordance with this diagnosis. Blood to the amount of six ounces or more was immediately removed by cupping the loins; free catharsis was induced by compound powder of jalap, which was continued in doses of twenty grains night and morning for two or three days; dry cupping was used; the patient was restricted to a vegetable diet, and tonics and stimulants were withdrawn from the system of treatment. In a short time improvement was manifested by increased power in the lower limbs and by the return of the sensibility of the surface. On Feb. 11, 1863, he was able to raise both his legs in bed; in a fortnight or more he endeavored to use his legs out of bed, and with assistance was able to rest a little upon them but could not exercise any directing or controlling power. Week by week improvement was noted by the manifestation of some power regained, but the pressure of the feet upon the floor continued weak and uncertain for a time. On March 22 the patient was allowed a pass to go to the city partly on foot and partly on the passenger railway car. On April 25 he was transferred to the military hospital nearest his home in the State of New York. At this time he was able to make very good use of his legs and was strong and healthy in his general condition.—*Satterlee Hospital, Philadelphia, Pa.*

A spasmodic asthma appeared as a sequel in the following case:

CASE 62.—Private James Barnes, Co. G, 71st Pa.; age 17; a convalescent from typhoid fever; was admitted Dec. 8, 1864, with deafness and spasms of the diaphragm. He was much debilitated and anæmic. The diaphragmatic spasm, which occurred at first nearly every night, produced constriction of the chest and seriously interfered with the breathing; there was also some spinal tenderness between the shoulders. He was given salines, tonics and antispasmodics, and a blister was applied between the shoulders; but the spasms continued to recur until the following powder was tried: Cream of tartar half an ounce, muriate of ammonia one drachm, citrate of iron and quinia twenty-four grains, aloes twelve grains, strychnia one grain, mixed well and divided into twelve powders; one three times a day. This finally controlled the spasmodic action. He was returned to duty, still slightly deaf, April 13, 1865.—*Act. Ass't Surg. A. J. Dickerhoff, U. S. A., Hospital No. 5, Quincy, Ill.*

Cases 63–65 are presented as instances of relapse in typhoid fever; in 65 the diagnosis of typhoid does not appear to have been clearly established.

CASE 63.—Private Edwin O. Johnson, Co. I, 8th Mass., was admitted June 17, 1863. This patient had suffered from typhoid fever at Port Royal, but had so far recovered as to be able to be removed by steamer. On admission he was anæmic and had diarrhœa. Two days afterward he had fever and typhoid symptoms were gradually developed; the tongue became dry, the mind dull, an eruption, disappearing under pressure, was found on the abdomen, there was some epistaxis and the pulse became frequent and feeble. Involuntary stools followed, but there was no hemorrhage from the bowels until the 24th, on which day the patient died.—*Ladies' Home Hospital, N. Y. City.*

Case 64.—Private John Thayer, Co. I, 9th Mich. Cav., was admitted July 16, 1863, with typhoid fever. An expectorant, a tonic laxative, a diaphoretic and a mouth-wash of chlorate of potash were prescribed. The patient was delirious on the night of the 21st and passed five copious watery yellow stools. Next day his pulse was 112 and tongue covered with sordes; the delirium was lessened; three stools were passed; there was some cough and mucous râles were heard over the lungs. The delirium recurred on the following night; the stools were passed involuntarily; pulse 100 and very feeble; skin cool. He rested well on the 23d and was free from delirium next day, but the diarrhœa continued until the 27th, the tongue meanwhile cleaning and the lung symptoms abating. After this his progress was satisfactory until about August 17, when a violent diarrhœa set in. On the 20th the tongue was dry and yellowish-white in color, the pulse had risen from 84 to 110, the bowels were tender and had been moved twelve times in the previous twenty-four hours, the stools being large, watery and sanguinolent. Stimulants and astringents were employed, but death took place on September 5.—*West End Hospital, Cincinnati, Ohio.*

Case 65.—Private Peter Dickerhoff, Co. E, 115th Ohio; age 20; was admitted with typhoid fever Nov. 10, 1862. On the 3d he had been exposed to cold night-air after being overheated by marching at double-quick time. A rigor followed and diarrhœa set in causing four to six stools daily. Quinine was given. On admission his face was livid and anxious, eyes dull, skin dry and hot but without eruption, tongue somewhat furred, thirst urgent, appetite deficient, stools watery, pulse 104 and compressible; he had severe frontal headache, pains over the whole body and twitchings of the muscles. Neutral mixture was prescribed. On the 14th the stools became less frequent and more fæcal in character but very fetid. Next day the patient's eyes were brighter, pulse 94, soft and regular, tongue moist but much furred, skin moist, cool and without eruption; four fæcal stools were passed. Stimulants and chicken-broth were given. Little change occurred until the 21st, when there was an increase of the fever towards night. On the 22d there was less fever and the tongue was moist and less furred, pulse 90 and compressible. Frontal headache and five stools were reported on the 23d, and next day the headache was characterized as periodic. Quinine was given on the 25th and 26th, but brown mixture was substituted on the following day, as there was some cough with scanty expectoration. The patient continued to improve until December 6, when he relapsed somewhat in consequence of a frightful railroad accident near the building. On the 8th he was quite drowsy and had subsultus; pulse 90, weak and compressible; skin hot and harsh; tongue furred. Sulphate of quinia in one-grain doses was prescribed for use every two hours. On the 9th he was less drowsy, the bowels were more regular and the subsultus lessened. On the 14th there was difficulty in hearing, but after this he improved steadily and was sent to general hospital at Camp Dennison Feb. 12, 1863.—*West End Hospital, Cincinnati, Ohio.*

Two cases, represented as second attacks of the specific fever, are also submitted:

Case 66.—Corp'l William H. Lake, Co. K, 126th N. Y., was admitted Dec. 12, 1862, on account of a sprained ankle. A few days after a case of typhoid pneumonia was transferred to the ward; he complained, Jan. 13, 1863, of some headache and nausea, and next day was in bed at the morning visit with vomiting, diarrhœa, coated tongue and anxious countenance. Mercurials were given and a Dover's powder at night. On the 15th astringents were ordered with quinine in two-grain doses four times daily. He passed a very restless night, and on the 16th the pulse was 120, skin dry and hot, tongue dry, face flushed and right iliac region tender. The quinine was continued with turpentine and stimulants added. Rose-colored spots appeared on the 20th, on which day there was also epistaxis, meteorism but no diarrhœa; the pulse was still rapid, about 100, the tongue somewhat dry but moist on the edges, the mind clear. [The patient stated, and his father subsequently corroborated the statement, that he had at a previous period suffered from typhoid fever with a relapse and a prolonged convalescence.] On beef-tea, chicken and oyster-soup, milk-punch, etc., with quinine, he progressed favorably, and was able to walk on February 12. He was furloughed on the 19th.—*Satterlee Hospital, Philadelphia, Pa.*

Case 67.—Private David Lacy, Co. K, 136th Pa.; age 31; was admitted Dec. 16, 1862. He had suffered from pain in the breast, cough and hæmoptysis, weakness and diarrhœa since October 3. He stated also that two years before he had been affected with what was called typhoid fever by his physician. This attack, which had lasted several weeks, was characterized by delirium and diarrhœa, with tympanites, pain in the bowels and an eruption on the abdomen, great weakness, emaciation and prolonged convalescence. On December 22, a few days after his admission, he had a chill which was followed next day by fever, diarrhœa, debility, headache and hebetude, and on the 24th by epistaxis and great thirst but no nausea. On the 27th he had another aguish paroxysm, and three grains of quinine were given three times daily. On the 30th he was reported as having been somewhat delirious during the preceding night, walking undressed in the ward, trying to urinate into the stove, insisting that the doctor had sent for him, etc. On the 31st his tongue was cleaner, his pulse nearly natural; there had been no delirium during the previous night but six liquid stools had been voided. The same general condition was found on Jan. 1, 1863, but the expression was dull and next day the tongue was rather dry. On the 3d the eyes were injected, the skin harsh, the bowels nearly natural, pulse 84. The patient coughed much during the previous night and brought up mucus dotted with blood; percussion gave a dull sound and respiration was feebly heard over the lower third of the left lung, but there was no crepitus nor bronchial respiration. The quinine was suspended. Next day numerous rose-colored spots appeared on the skin of the abdomen and chest; the skin of the face had a varnished look; the mind was clear, the hearing slightly obtuse and there was slight headache. Sudamina appeared on the 5th in the iliac region and on the neck; the abdomen was moderately distended; one stool was passed; the matter expectorated was thick and rusty. The hearing was improved on the 6th and the tongue more moist. The progress of the case was steadily towards convalescence; dulness of hearing was, however, very noticeable until the 14th. The patient was able to leave his bed on the 23d, after which he gained rapidly in flesh and strength.—*Satterlee Hospital, Philadelphia, Pa.*

III.—TYPHUS FEVER.

Although 2,501 cases of typhus fever, 850 of which were fatal, were reported among the white troops, and 123 cases with 108 deaths among the colored troops, the case-books contain particulars of only six cases that were recorded under this heading, while the medical descriptive lists of but ten cases have been placed on file. Cases 1–6 from the case-books are submitted in full; cases 7–13 are abstracted from the descriptive lists. Three cases treated in September and October, 1863, at the St. James Hospital, New Orleans, La., are not presented, as the official papers, signed by J. V. C. SMITH, Act. Ass't Surg., U. S. A., give no information except as to names, dates and results,—death in one instance, recovery in a second and transfer to another ward on account of an attack of erysipelas in the third.

CASE 1.—Private Ira Martin, Co. I, 1st Mich. Sharpshooters; age 23; on his recovery from a gunshot injury of the arm was placed on light duty in the kitchen, and while thus employed was seized, Jan. 7, 1865, with a severe chill followed by high fever; his tongue was coated, mouth clammy, bowels constipated, and he had severe headache and pain in the back and limbs. Blue-pill and quinia were given. The fever abated but recurred at noon next day with increased violence. On the 10th the fever had become continuous; the eyes and skin were injected, and the latter presented spots on the chest and abdomen which were neither true petechiæ nor the characteristic rose-colored spots of typhoid fever. Next day the pulse was frequent, small and irregular, the tongue coated brown and the patient delirious. Quinine and stimulants were prescribed; but on the 12th the stools became involuntary and the surface livid. Death occurred on the 13th. [*Acting Assistant Surgeon* WM. H. GRAFTON, *U. S. Army*, the attending physician, at first regarded this as a case of typhoid fever, but the injection of the surface and the subsequent collapse led him to change the diagnosis to typhus, the more so that the patient had access to a ward in which was a well-marked case of this fever.]—*Hospital, Annapolis, Md.*

CASE 2.—Private William E. Tullis, Co. C, 134th Ohio; age 19; was admitted May 17, 1864, with measles. He recovered and was returned to duty June 25th, but being seized with acute diarrhœa and high fever was re-admitted on the 28th: pulse 110; face flushed; eyes suffused; mind confused and anxious. Astringents were prescribed. Next day he was restless, anxious, feverish and had several discharges from the bowels. On the 30th the pulse was 116, tongue red and smooth, face flushed and spotted, mind anxious, stools frequent and watery. Turpentine emulsion was prescribed. On July 2d the patient lost twelve ounces of blood by epistaxis; he was much exhausted; the delirium and diarrhœa continued. The nostrils were plugged anteriorly with lint saturated with persulphate of iron and tincture of iron was prescribed for internal use. On the 4th brandy was given every three hours. The diarrhœa ceased on the 7th; the tongue became moist and the mucous and salivary secretions increased in quantity and were of healthy appearance, but the delirium continued and the exhaustion was very great. On the 9th there were involuntary discharges from the bowels and bladder. Death occurred next day.—*Cumberland Hospital, Md.*

CASE 3.—Private Isaac H. Starr, Co. F, 119th Ill.; age 23; was admitted Oct. 25, 1862, having been sick for about four weeks with fever. Diagnosis—typhus fever. On admission the tongue was dry and red, dark in the centre, pulse 92, skin dry and hot, bowels not painful but moved three or four times in twenty-four hours; he had much thirst and some cough. Turpentine emulsion and syrup of ipecacuanha were prescribed. He was restless and somewhat delirious during the night but perspired slightly towards the morning of the 26th; during the day he had occasional but slight epistaxis. Small doses of opium and quinine were added to the treatment. The skin continued moist, the stools became less frequent, and on the 30th the tongue lost its dryness and began to clean, but the patient talked incoherently and was seized with a general tremor on moving. On November 1 he seemed somewhat better; the tongue was moist, pulse 78, but the tremors of the hands continued. The dose of turpentine was increased and whiskey was added to it. There was a slight improvement up to the 6th, when the mind again wandered and the tongue became dry, red and cracked transversely in the centre; the bowels were neither loose nor tender, but the recti muscles were somewhat tense. Next day there was tremulousness of the muscles of the face with subsultus; the patient was drowsy and his mind feeble; the bowels became loose on the afternoon of this day but were controlled by tannin and morphia. On the 8th the intelligence returned. The tongue and skin were moist on the 9th, but the former became somewhat dry next day, and in the afternoon while perspiring profusely a copious bloody dejection was passed from the bowels. Similar bloody stools recurred on the 11th, after which the pulse became feeble and the general appearance of the patient unfavorable. Opium, tannin, quinine and capsicum were given with whiskey, beef-soup and egg mixture; but the stools continued bloody or wine-colored, though less frequent; the pulse was very feeble and the features shrunken. Opiate enemata were also used. On the 14th there was nausea and a quantity of green liquid was vomited. Death occurred on the 15th.—*Hospital, Quincy, Ill.*

CASE 4.—Private Isaac Howell, Co. D, 119th Ill.; age 20; was admitted Nov. 1, 1862, having been sick for eight days. Diagnosis—typhus fever. He had pain in the back and breast; his tongue was red and rather dry, pulse 88, skin warm and bowels open. Small doses of quinine and Dover's powder were prescribed. On the 2d the patient was incoherent and somewhat deaf; the stools, thin and dark-colored, were not accompanied with pain. Turpentine emulsion, sweet spirit of nitre and paregoric were prescribed in addition to the quinine and Dover's

powder. On the 4th he was very wild during the night and attempted to leave his bed. Wine was added to the treatment. The patient slept occasionally but his sleep was interrupted by startings; the mouth and lips became covered with sordes, the tongue foul and the body emaciated. The skin was moist on the 7th, but delirium of a violent character continued; his inspirations were deep and inclined to be stertorous. On the 8th he was exceedingly wild and incoherent; the pulse 90, tongue more moist but covered with sordes, skin bathed in a copious sweat, bowels quiet. Quinine, chlorate of potash and capsicum were prescribed with stimulants and beef-soup. In the evening he had involuntary stools and red spots appeared on his body and face; he was much prostrated and his features very haggard. On the 9th he seemed more natural and could protrude his tongue with less difficulty. He perspired copiously on the 11th, and recognized his mother who had come to see him; his bowels were quiet. On the 12th and 13th there was delirium with no favorable change in the general appearance; the tongue was moist but red, raw and rough. He died on the 14th.—*Hospital, Quincy, Ill.*

Case 5.—Private Sanford C. Pruitt, Co. F, 25th Ind.; age 30; was admitted Feb. 2, 1865, with chronic rheumatism. April 28: Pulse 104 and full; tongue red and moist; pain in back; eruption over body; thirst; anorexia; slight headache. Diagnosis—typhus fever. Gave neutral mixture, milk and beef-tea. 29th: Pulse 115 and full; skin hot and dry; tongue red and dry in centre; thirst; one stool. Gave two grains of quinine every two hours. 30th: Pulse 116, feeble and irregular; tongue moist and red; no stool. Omitted quinine. May 1: Pulse 114 and feeble; tongue a little coated; no stool. 2d: Pulse 110; tongue natural; tinnitus aurium; no stool. 3d: Pulse 112; tongue moist; skin natural; urine natural; no stool. 4th: Pulse 104 and regular; tongue dry; skin natural. Gave oil of turpentine in emulsion. 5th: Pulse 100; tongue dry and furred; skin hot; no stool. 6th: Pulse 85 and regular; tongue moist; one stool. 7th: Pulse 78 and rather feeble; tongue moist at edges, a little furred; no stool; free pneumonitic expectoration. 8th: Pulse 86; tongue moist; no stool; listless and dull. 9th: Pulse 70; tongue clean; skin moist; one stool; convalescing. 10th: Transferred to Mower hospital, Philadelphia.—*Cuyler Hospital, Philadelphia, Pa.*

Case 6.—Elijah Watts, contract nurse. April 29, 1865: Tongue coated but moist; pulse 102; skin dry and warm; eruption over body; three stools; thirst; restlessness; nervous tremors. Ordered neutral mixture and brandy every two hours and a tablespoonful every three hours of a mixture of a half drachm of quinine in one ounce each of syrup of rhubarb and water; arrow-root and milk diet. 30th: Delirium; pulse 125, feeble and irregular; tongue dry; skin hot; one stool. May 1: Pulse as before; tongue moist; skin warm; profuse epistaxis; tinnitus aurium. Discontinued brandy; gave a teaspoonful every two hours of one drachm of oil of turpentine in two ounces of mucilage. 2d: Pulse 115; tongue dry and clean; skin natural. 3d: Pulse 105; tongue moist; skin natural; delirium. Gave occasionally a teaspoonful of a mixture containing one drachm of chloroform in one ounce and a half of alcohol. 4th: Pulse 100; tongue parched; urine drawn off by catheter. 5th: Pulse 100; tongue and mouth very dry; inability to speak or protrude tongue; dull, somewhat comatose; eyes and mouth open. 6th: Pulse 98; tongue and mouth dry. 7th: Pulse 80; tongue and mouth moist; could protrude tongue and speak; rested better. 8th: Pulse 79; tongue cleaning; skin moist; breath and passages very fetid. 9th: Pulse 90; tongue cleaning; skin natural. The patient recovered. Contract annulled May 23.—*Cuyler Hospital, Philadelphia, Pa.*

Case 7.—Private Rudolphus Grant, Co. B, 10th N. Y.; age 23; was admitted May 27, 1863, presenting all the diagnostic characters of typhus fever inclusive of the eruption. Treatment consisted of twenty drops of diluted sulphuric acid every two hours, with alcoholic stimulants and nourishment. On June 30 he was quite well excepting that he complained of headache and debility. He stated that he had been insane and an inmate of the Utica asylum for six months three years ago. He was delirious during the course of the fever and during convalescence, but he did not show evidence of insanity. He was returned to duty July 23.—*Act. Ass't Surg. Austin Flint, U. S. A., Lexington Avenue Hospital, N. Y.*

Case 8.—Private John McManus, Co. C, 25th N. Y.; age 29; was wounded in the right arm at the battle of Fredericksburg, and had the forefinger of the left hand carried away by a shot. He was treated in Bellevue hospital, which he left well as regards his wounds March 28, 1863; but although without definite ailments, his general health was not good. On April 1, while at his home in this city, he was obliged to take to bed, having at this time chills followed by febrile movement. He soon became delirious, and in this condition was received into this hospital on the 22d. He talked incoherently and made frequent attempts to get out of bed; the pulse was 120 per minute and feeble; there was no diarrhœa and the abdomen was not tympanitic nor tender on pressure; the body and extremities were thickly covered with an eruption presenting the distinctive characters of the typhus eruption, dusky in color, not elevated and the redness not disappearing on pressure. Whiskey, half an ounce hourly, with essence of beef and milk, were prescribed. His condition remained unchanged on the 23d and the treatment was continued. Next day there was less delirium; pulse 100; skin moist. The whiskey was diminished to half an ounce every two hours. The improvement continued on the 25th; the pulse had fallen to 85 and the eruption had faded considerably. The whiskey was reduced to half an ounce every three hours. On the 27th the febrile movement and delirium had subsided and the eruption was nearly gone. The patient desired food. Convalescence progressed without any unfavorable symptoms, and on May 1 his case was reported as cured, but some diarrhœa delayed his return to duty until June 29.—*Act. Ass't Surg. Austin Flint, U. S. A., Ladies' Home Hospital, N. Y. City.*

Case 9.—Private Martin Walker, Co. C, 10th N. Y. Cav., was admitted Feb. 11, 1864, with typhus fever. The eruption appeared soon after admission. He was treated with diluted sulphuric acid and whiskey, and a diet of beef-tea, eggs and milk. He was convalescent on the 26th and was reported for duty on March 1.—*Act. Ass't Surg. L. L. Tozier, U. S. A., Lexington Avenue Hospital, N. Y. City.*

Case 10.—Sergeant Ebenezer C. Talcott, 4th Me. Battery; age about 35; was admitted July 11, 1863, in a semi-comatose condition ascribed doubtfully to typhus fever. A companion stated that the patient was delirious when

put on board the boat at Sandy Hook, Md. The stupor gradually became more profound and death took place on the 16th.—*Act. Ass't Surg. John H. Hinton, U. S. A., Hospital, Lexington Avenue, N. Y. City.*

Case 11.—Private Abraham Koof, Co. M, 10th N. Y. Art.; age 23; was admitted June 10, 1863, with typhus fever. The fever continued twenty days after his admission, and during this time there was much deafness and delirium. The eruption was marked and disappeared under pressure. There was considerable tympanites and diarrhœa but no hemorrhage from the bowels. Epistaxis occurred several times during the early part of the attack. He suffered from bronchitis but not in a marked degree. On July 1 he was able to sit up and on the 9th was around the ward although suffering considerably from diarrhœa. Tonics, stimulants and opium with camphor were administered. On August 15 the diarrhœa continued and the patient was anæmic; he was able, however, at this time to walk in the yard. He was returned to duty November 29.—*Act. Ass't Surg. F. Everts, U. S. A., Central Park Hospital, N. Y. City.*

Case 12.—Recruit John Talbot, unassigned; age 20; was admitted Oct. 1, 1864, with typhus fever. He was treated with alcoholic stimulants. On the 8th the patient became delirious; pulse 120; an eruption appeared on his chest. Two days later pneumonia set in and death took place on the 15th.—*Hospital, Elmira, N. Y.*

Case 13.—Private William A. Wood, Co. K, 21st Mich.; age 25; was admitted May 20, 1865, as a case of typhus fever. On June 8 he had headache, pain in the back and pain with some soreness in the right hypochondrium; the tongue was slightly coated but quite red on the edges and tip; pulse 110. Soon after this delirium set in, and on the 11th the patient was nearly pulseless, his jaw quite stiff, subsultus strongly marked and skin covered with cold perspiration. Brandy and Hoffmann's anodyne were given. Next day he recovered his mind and seemed stronger, but the improvement was temporary. He died on the 16th.—*Act. Ass't Surg. C. A. Burnham, U. S. A., Hospital, Fairfax Seminary, Va.*

III.—SYMPTOMATOLOGY OF THE CONTINUED FEVERS.

I.—COMMON CONTINUED FEVER.

From the absence of clinical histories of cases of common continued fever it is impossible to speak from the records concerning the symptoms of the many cases which were reported under this title during the first fourteen months of the war. The single case of *simple continued fever* and the seven cases of *continued fever* that have been presented are insufficient to illustrate the disease.

It has already been shown that typhoid fever was recognized as the common continued fever of the United States, and that the tendency of medical opinion at the outbreak of the war was to regard all cases of continued fever which were not distinctly specific in their character as due to the poison of typhoid.* But the indefinite term common continued, which at one time included typhoid among other possible fevers, remained on the army sick reports, after the differentiation of typhoid, as a standing suggestion of the existence of

*This opinion seems to have become more extensively diffused since that time both in this country and in Britain: Maclagan gives expression to this view, *Edinburg Med. and Surg. Jour.*, April, 1871, where he says, p. 875: "Indeed, I think it may be stated generally that a febrile attack which is too long to be febricula, which is not ague and which is not due to local disease, must be enteric." Nevertheless Murchison, although regarding as typhoid fever most of the cases called by British practitioners simple continued fever, describes the clinical histories of four non-specific varieties: The first, *ephemeral fever*, is similar to a single paroxysm of ague. Chills or rigors are followed by a quick full pulse, flushed face, dry hot skin, white furred tongue, thirst, anorexia, constipation, scanty high-colored urine, severe headache, restlessness and sleeplessness or sometimes drowsiness and pains in the limbs. The symptoms subside suddenly, often with perspirations, in twelve, twenty-four or thirty-six hours. In the second, corresponding to the synochal grade of the inflammatory fevers of the old writers, the febrile action continues from four to ten days; the pulse is full, rapid and often hard or bounding; the headache acute and throbbing; sometimes there is delirium. Defervescence is attended with perspirations, epistaxis, vomiting or diarrhœa, and is so frequently associated with herpes on the lips or nose that the disease has been called *herpetic fever*. The *ardent continued fever* of the tropics constitutes his third variety, which is regarded as an exaggerated form of the synocha of Britain. As seen among the European troops at Calcutta in 1853 and in Burmah in 1854, the disease mostly affected young plethoric recruits recently arrived from Europe, and prevailed in the hot, dry months, when the temperature was never below 84° Fahr. The symptoms, which in many cases commenced immediately after incautious exposure to the direct rays of the sun, were chilliness; nausea or vomiting; accelerated, full and firm pulse; dry burning skin; flushed face; giddiness; intense headache; ringing in the ears; intolerance of light; muscæ volitantes; restlessness and sleeplessness; yellow furred tongue; parched lips; thirst; constipation; scanty high-colored urine. Acute delirium occurred about the fourth or fifth day, followed by unconsciousness, contraction of the pupils and sometimes complete coma, which ended in death between the sixth and ninth days if convalescence was not meanwhile established by a copious perspiration. He cites Morehead and Martin in support of his assertion that the subsidence of the fever was occasionally followed by sudden or even fatal collapse. The fourth variety is introduced rather as a suggestion than as a clinically defined entity. It is called *asthenic simple fever*, and is said to be characterized by loss of appetite and strength; pulse rather feeble, ranging from 90 to 120; slightly furred tongue; confined bowels; headache and disturbed sleep. The symptoms continue for two or three weeks without any great change except increasing prostration. It is evident that the difficulty of discriminating between this variety and mild typhoid attacks would be very great, in fact, clinically the discrimination is impossible. The distinction could only be effected by the aid of etiological considerations.—*A Treatise on the Continued Fevers of Great Britain*, London, 1873, p. 679 *et seq.*

other non-symptomatic febrile conditions. It seems probable, however, that the common continued fever of the monthly reports consisted in great part of anomalous cases of typhoid. When the characteristic symptoms of typhoid were present in a given case its entry under the specific heading was assured; but when these were absent, obscured or modified, the term common continued fever afforded a convenient escape from a positive and specific diagnosis. When a febrile case did not run the prolonged course of typhoid; when it was unmarked by rose-colored spots and free from relaxation of the bowels or tenderness in the right iliac region; especially when in addition the cerebral symptoms did not appear to justify the application of typhoid, the indefinite term accommodated it with an appropriate position on the official record.

It is equally probable that there were reported under this heading many febrile cases of short duration which were treated in quarters or in the regimental hospitals. Such cases corresponded with the *simple continued*, *ephemeral* or *irritative** fevers of medical writers, presenting languor, lassitude, muscular weakness, headache, inability to collect the thoughts, wakefulness or dreamful sleep, perhaps even slight nocturnal delirium, constipation or diarrhœa, white-coated tongue, hot skin and feeble and rapid pulse. This condition lasted one or more days, was followed by perspirations or a gradual subsidence, and was seldom characterized by the tedious convalescence of the typhoid attack.

If it be allowed that cases of this character occurred among the troops, some of them must have assumed an adynamic form and represented with more or less fidelity the general outlines of the clinical picture of typhoid fever; for the influences to which the adynamic condition is usually attributed were in strong force in our camps and garrisons during the war. As distinguishing between such cases and typhoid fever there would have been the absence of rose-colored spots, a want of connection between the diarrhœal attack and the febrile condition, perhaps also the character of the alvine evacuations and the location of the intestinal tenderness, with the short duration of the primary fever in cases that had been closely watched from the commencement. These would have been correctly reported during the early months of the war as cases of common continued fever, although from the concurrent prevalence of undoubted typhoid they were liable to be regarded as expressions

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*"Under the term *Irritative Fever*, Dr. Gerhard S. Wood includes all cases of idiopathic fever resulting from non-specific causes of irritation. An over excitement of one or more of the functions is induced, and this being propagated to different parts of the system may throw all the functions into a state [illegible] sustaining itself after the first cause has ceased to operate. There must be a pre-existing disposition in the system to the febrile movement that it may be thus independently sustained. There is occasionally slight inflammation associated with the fever, most frequently in the fauces or in some portion of the alimentary or pulmonary mucous membrane, but this is wholly insufficient to account for the symptoms and is often wanting entirely; moreover, a truly symptomatic fever subsides immediately with the subsidence of the inflammation. He observes that when the febrile action is prolonged to the seventh or tenth day, it is apt to become somewhat remittent, relaxing in the morning and undergoing exacerbation in the afternoon or evening. It is usually sthenic. "But occasionally the general actions of the system, though excited, have the taint of feebleness. A low fever somewhat of the typhus character is developed, though infinitely less dangerous than the genuine typhus. The previously debilitated condition of the patient, a depraved state of his blood from bad living, or exposure for some time to depressing influences, as of certain epidemics, exhalations from privies, etc., may account for this adynamic character."—*A Treatise on the Practice of Medicine*, Philadelphia, 1847, Vol. I, p. 224. Under the term *Cess-pool fever*, Dr. Alonzo Clark describes a febrile disease which has been traced in almost every instance to foul water or water made foul by the admixture of human excrement or to neglected privies. It is not always ushered in by a chill, but there is always a certain amount of fever and a diarrhœa lasting two, three or more weeks. The illustrative case which he records had no headache, epistaxis, tenderness or pain in the abdomen or iliac region, tympanites, sordes, nor rose-colored spots; delirium was moderate, the patient trying to get out of bed, saying he wanted to go home; the [illegible] and the [illegible] took place from exhaustion about the end of the third week. Cases of this kind [illegible] according to the experience of Dr. Clark, in every region of the country; and he holds that, so far as we can judge from the symptoms, they are not cases of the typhoid affection.—See *Med. Record*, Vol. XIII, New York, 1878, p. 303. Dr. I. A. Watson of New Hampshire, in the *Report of the State Board of Health*, 1884, regards as cess-pool fever certain cases which originated in a poisoned well at Little Boar's Head. They seemed to be [illegible] A wealthy Philadelphian who had spent many summers at Little Boar's Head [illegible] residence there on an elevation about fifty feet above the sea-level and but a short distance from the water. The elevation consisted of [illegible] only a few feet of soil covering them. Instead of building a sewer to the ocean he constructed a cess-pool forty feet from the house. [illegible] and the [illegible] were at the same level, was dug the well which was to supply the residence with water, but before a free supply [illegible] was obtained it was discovered that the cess-pool was the source. The well and cess-pool were both constructed at the same time, and two weeks [illegible] before the [illegible] but the family did not recognize the cause and nature of the pollution continued to use the water until it [illegible] of the [illegible]. The water in a lady visitor died from the febrile attack, the owner's daughter, a servant and a guest of the family [illegible] with illness.

of the presence of the poison of that disease modified by peculiarities of individual constitution and local hygienic conditions. During the latter part of the war it may be assumed that they were reported among *other miasmatic diseases* by those who regarded them as due to an unknown miasm, or that they were added to the typhoid or typho-malarial list, according to the views entertained by the reporting officers of the absence or presence of a malarial factor in cases essentially enteric. The following extracts from sanitary reports have a bearing on this subject:

Surgeon THOMAS C. BAKER, *7th Me., Camp Lyon, Baltimore, Md., Oct.* 1, 1861.—From the time the regiment was mustered into service at Augusta till the close of the quarter ending September 30 only one death occurred. This was a case of typhoid fever. Among *other diseases of this class*, in the class of fevers, are eight cases, all of fever or feverishness, some of which approached common continued fever in their general characteristics.

Surgeon W. W. BROWN, *7th N. H., St. Augustine, Fla., March* 31, 1863.—I neglected to mention a variety of fever which seems rather peculiar to this place, and which made its appearance in our regiment in December last and continued to affect us somewhat during January and February, but entirely disappeared about the first of the present month. It usually commenced with the general symptoms of fever, and in most cases assumed the common continued type. It had no appearance of having had a miasmatic origin, but seemed to have been occasioned by the frequent and sudden variations of temperature which we experienced during those months, and to which all places on the Atlantic coast are subject, although the range of the thermometer may be small. About four-fifths of the cases were mild and required little treatment other than low diet and rest after having the primæ viæ thoroughly evacuated. The remaining fifth tended to a typhoid condition, with diarrhœa, and some of them assumed a very grave character, although all recovered with one exception. The typhoid cases were treated on general principles, but early required stimulants and nourishing diet, with occasional opiates to allay nervous irritation. There was more or less pulmonary inflammation in the severe cases, and the diarrhœa was very intractable. Stimulants were well borne, but quinine was neither required nor well adapted except during convalescence. We had in all over one hundred cases; in the fatal case involuntary evacuations with low delirium and subsultus of the tendons came on early, and our most active exertions proved unavailing.

Surgeon J. T. CALHOUN, *74th N. Y., near Alexandria, Va., June* 30, 1862.—But the stench from the battle-field [Fair Oaks] was most disgusting; and in such an atmosphere, in the month of June, were our men living. Every third day they were on picket, and in the interval they were frequently employed in the trenches. Skirmishing was of daily occurrence, and night alarms frequent and harassing; I seldom passed a day without having a wound to dress. The men were ill fed, overworked, exposed to frequent alarms and living in an atmosphere largely composed of poisonous gases exhaled from the imperfectly buried dead. A peculiar form of fever presented itself, characterized by an extremely weak pulse, great prostration, suffused eyes, vertigo and anorexia. Its duration was generally from four to five days. The treatment was usually a mercurial cathartic followed by ten-grain doses of quinine three times a day.*

Surgeon M. R. GAGE, *25th Wis., Camp Randall, Wis., Dec.* 31, 1862.—We have met with cases of continued fever which might properly be termed passive in character in contradistinction to those of a more absolute and active grade. These, although manifesting but little activity, it being in fact scarcely possible to determine the existence of fever in many of the cases, are liable to indefinite protraction. The treatment most efficacious in this class of cases consists of a calomel cathartic and then a judicious alterative, diaphoretic and refrigerant course. Recovery generally ensues as soon as the specific effect of the mercurial is produced. A full dose of calomel in the incipiency of the cases goes far towards interrupting and controlling the period of their continuance; the hepatic derangement is overcome, the pulse reduced, and the skin having resumed its natural function, a march is stolen upon the disease and convalescence is quickly induced. A stimulating plan has not been required; that generally pursued has been mildly antiphlogistic. During convalescence tonics and a more generous diet are allowed; in many instances at this period remedial agents are entirely withdrawn and the patient left to the recuperative forces of his purified and regenerated organism, together with the invigorating influences of a generous but carefully selected diet.

Ass't Surg. HENRY S. SCHELL, *U. S. A., Miner's Hill, Va., Sept.* 4, 1862.—Cases of fever were of constant occurrence during the quarter, and under whatever name registered, they were all of the same general asthenic character. So far as I can determine, few if any of those which assumed a decided periodic form originated primarily in this locality. Miasmatic affections seemed in most instances to be the result of the seeds of disease which had remained in the system from last year and were now quickened into activity by exposure to the vicissitudes of a campaign. The prevailing form of febrile disease I regarded as an ordinary irritative fever of an adynamic type, and many of the cases marked as remittent fever in the statistical report were of this kind; they assumed a sort of periodicity which was not well defined, but which rendered it difficult to decide upon their true nature. Every case which I have registered as common continued fever was of the same character as those which other surgeons in the division reported remittent fever, but which on several grounds I considered independent of malarial influences. 1st: The affection usually followed exposure to sudden changes of weather, hard duty or rapid and exhausting marching—as for instance, the expedition to Hanover Court House. In the light batteries the fever did not follow exposure on picket duty in the swamps of the Chickahominy because the men, once upon the ground, stretched the tarpaulins to make shelters for themselves and went as regularly and comfortably to bed as when in camp. With the infantry

* In the *Medical and Surgical Reporter*, Phila., Pa., Vol. IX, p. 399, DR. CALHOUN refers to this fever, and considers the name typho-malarial an appropriate one for it.

pickers it was different: they, perhaps as a measure of not one hundred yards from the batteries, stood in water to the knees during the long watches of the night, and returned to camp after forty-eight hours utterly exhausted, and in a few days, at most on the next day, were having pitch-fever. [illegible] The cases began with languor, debility or utter prostration, and in all instances gradually: the tongue was coated with a white fur, the bowels mostly loose, but sometimes costive. The morning thermometer stood close to the patient long after the fever had disappeared and occasionally threatened to destroy him: there was considerable heat of surface, pulse about 100 or 110; in a few cases derangement of the liver was present: there was invariably a tendency to debility, which rendered the use of stimulants necessary from the beginning; towards the close of the disease the kidneys were often affected, and the mind was always implicated if the sickness became serious. [illegible] Most of the cases were cured, if properly treated, in from four to ten days without the administration of quinine, which drug usually retarded recovery, when given in antiperiodic doses, by producing a diarrhœal aggravation of the existing debility. 4th: The treatment which I found most effective was to enjoin perfect rest and keep the bowels in as natural a condition as possible. Dover's powder was administered as a diaphoretic when there was much excretion wanting. The nitrate of potassa was sometimes given. In all cases the patient was restricted with milk-punch, eggs, beef-essence, etc. Under this plan he was nearly able to report, before he, made or maddox being avoided.

In discussing the causes of this disease I should enumerate the predisposing and the exciting. Among the former must be counted fear, as I believe the best men succumbed; the debilitating action of fatigues and privations; exposure to the effects of both combined under [illegible] from slaughter-pens and excrement deposited in trampled places, and the continued occupation of the same camping ground. The chief of the exciting causes were malaria, fatigue and privations and vicissitudes of weather.

Surgeon Edward W. Gurnsey, 1st Pa. Cav.: Memphis, Tn., Dec. 12, 1862.—The sickness was of a peculiar type, characterized by exhaustion of the nervous system with stagnation of the capillary circulation. This was preceded by blueness of the skin, which began the second day of the fever. The face was of a dull leaden color and the features blunted and swollen. The peripheral vessels receiving the largest proportion of the blood showed on them the outlines of the bulb-bottom to which the seat of disease. This was accompanied by frequency of the pulse, great lassitude, muscular and articular pains, especially in the back, great thirst, red and parched tongue and violent pain in the head with more or less insensibility. These cases, known familiarly as "camp-fever," were difficult to treat as "convulsions ensued." The causes were unquestionably protracted and exhausting labor, exposure to cold and incessant rains, insufficient clothing and scantiness of food.

The treatment had in view the control of congestion and normalization of the capillary circulation. When this was accomplished convalescence was hastened by the administration of tonics. Sulphate of magnesia with ipecacuanha was beneficial, particularly in the early stages. The fatal cases assumed the greater appearances of typhoid fever; tenderness of the colon appeared, with purging of the brown and liquefied texture; intestinal hemorrhage occurred in many cases and in all that were fatal.

Asst. Surg. H. M. Starrett, U. S. A.; Sept. 30, 1863.—About September 1, after having been encamped for a week in an exceedingly foul locality, there broke out a severe epidemic which has given us our only fatal cases of disease. [illegible] The earliest symptoms were nothing characteristic of any particular disease. The most marked simply debilitated. First in order was that for several days, often two weeks, they had been suffering from diarrhœa, yellowish and watery evacuations with griping and accompanied with debility, listlessness, drowsiness, pain in the loins, white tongue, slight heat of skin, nausea or vomiting and some quickness of pulse, ranging from 94 to 106. The disease had the appearance neither of typhoid nor of remittent fever. *Post-mortem* examination of two bodies revealed some congestion of the bowels, with moderate enlargement of the mesenteric glands; no ulceration of Peyer's patches; no destruction of the mucous membrane; no inflammation of the rectum; the spleen was slightly engorged; the other organs healthy.

II.—TYPHOID FEVER.

It has been a matter of some difficulty to the writer to present the symptoms of typhoid fever as distinct from those of the so-called typho-malarial fever. This has arisen from the [illegible] to show what constituted the characteristics of the cases reported under the latter heading.* For as Dr. Woodward in November, 1862, expressly stated that the term typho-malarial was meant to include only those cases in which typhoid fever had its symptoms more or less masked by the coexistence of manifestations of malarial poisoning. The detailed cases presented in the "Clinical Records of the Continued Fevers"

* [illegible] Woodward, Asst. Surg., U. S. A., *Outlines of the Chief Camp Diseases of the United States Army*, Phila., 1863, p. 74: "Under the designation of typho-malarial fever [illegible] I have grouped: * * *typhus*: * * *yellow fever*: * * *typhoid fever* with or without scorbutic complications; *malarial remittent fever* with [illegible] and a vast group of mixed cases, in which the malarial and typhoid elements are variously combined with each other [illegible] the author proposed the name of typho-malarial fever." * * But, on p. 110, in discussing the nature of [illegible] be regarded as a new disease in the ordinary acceptation of the term, that is, as an affection [illegible] predominant in many cases—perhaps, on the whole, in the greater number. Much rather should [illegible] pathological conditions, in which the exact train of symptoms is as variable as the degree [illegible]

afforded the materials for determining the symptoms not only of the cases regarded as typhoid by the attending physicians, but of those which Dr. WOODWARD would have classified as typho-malarial. In the chapter on malarial disease, in this volume, the characteristics of malarial fevers have been illustrated. By studying these in connection with the fully recorded typhoid cases treated in the Seminary hospital, the latter have been divided into cases of pure and of modified typhoid.

The paroxysmal type of the malarial fevers stands prominently forth as a diagnostic mark of the complicated disease, manifesting itself by recurring chills and febrile exacerbations alternating with perspirations or a moist condition of the skin at a period of the clinical history when, in pure typhoid fever, the febrile action is continued and the skin dry and husky. But these signs of undoubted complication are liable to be lost in two directions. On the one hand typhoid fever is marked by daily remissions, which may be detected, in the absence of thermometric records, by notable changes in the pulse, general surface, tongue, secretions, etc.; on the other hand, the remissions in remittent fever may be so slight or transitory as to escape unnoted. Hence, although the absence of the paroxysmal type does not exclude the possibility of the coexistence of malarial disease, its slightly marked presence cannot be accepted as indicating malarial complications unless supported by other and less indefinite evidence. It is impossible to determine in all cases that an evening exacerbation is due to malarial influences, but when the paroxysmal feature is strongly developed a remittent or intermittent fever may be regarded as associated with the progress of the typhoid affection. The frequency of this coincidence, especially in men who had previously suffered from acute malarial disease, leads to the supposition that the typhoid onset itself or the exposures and unhygienic conditions which predisposed to it, acted as the determining cause of a recurrence of the paroxysmal fever. Moreover, it is generally accepted that in malarious subjects diseases which are not occasioned by malaria oftentimes exhibit a tendency to periodicity. Nevertheless there are not wanting on the records cases of apparently unmodified typhoid in which the previous history of the patients embraced a series of aguish attacks or other indications of malarial poisoning.

When the complicating element failed to manifest itself by paroxysms and perspirations, which do not belong to the history of typhoid fever, its expression was found in hepatic tenderness, gastric irritability, epigastric pain and other signs of interference with the normal action of the liver and upper portion of the alimentary tract. In the absence of these from the record a modification of certain of the symptoms of typhoid fever may sometimes be attributed to the malarious condition of the patient. If, for instance, the malarial poison has not been productive of intestinal congestion, diarrhœa, which is one expression of the local lesion of typhoid, may not be prominent as a symptom, and this is especially the case when the malarial influence is manifested by frequently recurring perspirations; the character of the stools may also be altered. At the same time it is to be remembered that diarrhœa is not present in all cases of distinctly pure typhoid fever; its absence does not, therefore, constitute an indication of malarial complication except when in conjunction with other testimony of a more or less suggestive character. On the other hand, if the malarial influence has expended its force on the mucous lining of the intestinal canal, there may be diarrhœa and tenderness with other strongly marked signs of the abdominal lesion of typhoid fever; the tenderness, however, is general, or specially noted in regions other than the right iliac,—frequently over the tract of the colon,—and the stools are often of a dysenteric character. But here again there is a want of value for

diagnostic purposes inasmuch as typhoid fever engrafted on an antecedent diarrhœa or dysentery may give rise to such symptoms.

The reversed condition of the tongue furnishes in many instances satisfactory evidence of the presence of a malarial complication. In typhoid fever it had at first a slight coating of a white or yellow color, but redness of the tip and edges was generally manifested even at this period, and as the tongue dried and darkened on the dorsum the redness became more noticeable. When a malarial element was present this condition of the tongue did not generally obtain; it was pale, flabby and variously coated not only during the progress of the febrile phenomena but during convalescence.

The pneumonitic tendencies of typhoid fever were seldom altered by the presence of the malarial poison, although the latter had apparently a greater proclivity to the development of sudden and dangerous pulmonary congestions. Nor were the cerebral symptoms of typhoid materially changed by the presence of the complicating element except when this was prominently and perniciously developed, masking the continued type by its irregular paroxysms and changing the muttering delirium of the febrile condition into the coma of malarial congestion.

Extravasations of blood under the skin, constituting petechiæ and vibices, were common to the combined operation of both poisons; but an early appearance of such spots in typhoid cases which combined with other testimony, is suggestive of malarial complication. Deterioration of the blood, from scurvy or cachlesis, was also occasionally concerned in the development of these spots.

Lastly, a mild issue in fatal cases is indicative of malarial disease, since typhoid cases usually run a progressive course while the paroxysmal fevers were often fulminant.

By giving weight to these considerations the febrile cases treated at the Seminary hospital have been arranged into two series, one of pure typhoid and the other assumed, in more or less satisfactory evidence, to have been complicated by the malarial poison. From these and other cases submitted above, as also from a series of fatal cases to be presented hereafter in connection with the *post-mortem* appearances, the following general description of the clinical progress of the typhoid fever of the war has been written.

Cases regarded and reported as typhoid fever began with feverishness, depression of spirits, muscular debility and unusual relaxation of the bowels. Oftentimes the soldier suffered in this way for several days, attributing his condition to some particular exposure or indiscretion in diet, the effects of which he hoped would speedily subside. Ultimately headache, pain in the back, aching in the bones and muscles, loss of appetite and increasing weakness wholly incapacitated him for duty and led him to report as sick. As the patients were mostly young and inexperienced soldiers, it frequently happened that they did not realize their loss of health, but continued their usual occupations in an apathetic manner until their appearance led to inquiries by more experienced comrades or company officers, when they were sent to the regimental surgeon. In nearly one-half of the cases the disease was ushered in by a chill which was immediately followed by fever and perhaps headache, but not by perspiration: Of fifty-one typhoid cases found in the records of the Seminary hospital the onset was by chill in twenty, without chill in eleven, while in the remaining twenty the manner of the attack was not recorded.* Of the twenty cases

* [illegible] most of these patients also suffered from irregular chills, languor and giddiness; rigors occurred in only [illegible] in the analysis, he observed decided rigors and in fact all the phenomena of ague during the first few days—in one case.

that had an initiatory chill five were mild, eight severe and seven fatal; of the eleven that began with no marked sensations of chilliness three proved mild, six severe and two fatal. These numbers are not large, but so far as they go they indicate that the course of the disease is not affected by the mode of onset. It may be owing to an appreciation of this fact that few writers advert to the prognostic value of chill as an initial symptom of typhoid fever. Nevertheless Louis was inclined to regard a severe chill as suggestive of a severe attack, for his observations showed a greater frequency of chills among the severe than among the mild febrile cases.*

The course of the disease after this onset by defined chills or gradual accession differed much in individual cases. In some, probably in a majority of those which, anterior to the issue of the order removing common continued fever from the list of diseases on the monthly sick reports, would have been reported under that heading, the febrile condition did not at any time become more marked than during the first few days. The tongue was somewhat furred or white-coated, with the edges and tip of a deeper red than natural and with some tendency to dryness at the base and centre; the skin was dry, the face slightly flushed and the eyes injected, especially in the evening; the urine was scanty and the bowels relaxed or unusually susceptible to the action of laxative medicines; the pulse was seldom rapid, full or tense, but was occasionally dicrotic; slight epistaxis occurred at times; the cerebral manifestations were restricted to headache, restlessness, drowsiness and inability to concentrate the attention or follow up a train of thought; a bronchial cough often accompanied these symptoms. In a few days the febrile action subsided, the improved condition being first noticed after a sound and refreshing sleep, coincident with a cleaner tongue, diminished thirst and recovered appetite; occasionally perspirations, epistaxis or slight diarrhœa marked the defervescence. The patient, however, remained weak for a long time after the attack.

But in a majority of the cases the disease was prolonged for two or more weeks, during which time certain of the symptoms assumed a special gravity. The intestinal symptoms in some became especially noteworthy, consisting of a more or less active diarrhœa, with pain in the abdomen, tenderness on pressure, particularly in the right iliac region, gurgling and some tympanitic distention. The diarrhœa often subsided at the end of the second week, and this improvement was usually associated with an amelioration of the general symptoms, free perspirations and the appearance of sudamina. But when defervescence was effected gradually and without the occurrence of perspiration, relaxation of the bowels was prone to continue, with diminishing tenderness, perhaps for eight or ten days longer, during which recrudescence was not uncommon. The patient continued weak after the subsidence of the active symptoms, and at any period of the prolonged convalescence he was liable to dangerous recurrences of the diarrhœa from slight indiscretions in diet or other faults in the sanitary regimen.

The cerebral symptoms in other cases constituted apparently the special characteristic of the disease, for they were often present in the absence of diarrhœa and abdominal ten-

*Chills occurred in thirty-one of thirty-three fatal cases in which he was able to learn anything definite on this point; of forty-five severe though not fatal cases, all except three had chills or a greater sensibility to cold, while in thirty-one mild cases chills were reported in twenty-four only.—(*Recherches Anatomiques, Pathologiques et Thérapeutiques sur la maladie connue sous les noms de Gastro-entérite, Fièvre putride, adynamique, ataxique, typhoïde, etc.* Ch. A. Louis, Paris, 1829, t. II, p. 259.) Nevertheless, if the fifty-eight cases recorded in the work just cited are examined in reference to this point, it will be found that chills are not recorded as frequently as the above statements would lead us to anticipate. Forty-five of these cases are regarded as undoubted typhoid, the observations 46–58 being variously classified as doubtful, simulated, etc. In twenty-two of the forty-five cases chills are noted as having occurred at the beginning of the attack, and in one on the fourth day of the fever; in the remaining twenty-two cases either no mention is made of the symptom or it is positively stated that it was not present.

derness. The wakefulness and restlessness which affected the patient during the first week of the disease increased at night, until sleep became disturbed by incoherent mutterings. During the day he was drowsy, and when aroused was found to be dull and stupid, held at attention for the moment but relapsing immediately into a semi-somnolent or mildly delirious condition. In such cases the tongue became dry and dark-colored, retaining however the redness of its margins, and with diarrhœa present the stools were often passed without the consciousness of the sufferer; the urine was also sometimes evacuated involuntarily, or retained, causing hypogastric distention and pain until removed by the catheter. In most cases at this period sordes accumulated on the teeth and gums. But at the close of the second week, coincident with a moist condition of the skin, epistaxis and sudamina, the tongue became moist, the mind clear, the appetite improved, and refreshing sleep, enjoyed for the first time since the occurrence of the attack, ushered in the period of convalescence.

Generally in cases which ran a two weeks' course to defervescence the rose-colored eruption, viewed by most of our medical officers as characteristic of the disease, was discovered on the chest and abdomen from the seventh to the fourteenth day. In several instances the appearance of this eruption about the end of the second week was associated with improvement, and was the only concomitant of defervescence entered on the record.

Death seldom occurred before the fourteenth day except as the result of accident connected with the febrile condition, as in case 41 of the Seminary series, in which the patient was killed by jumping from a window in his delirium, or by some intercurrent attack, as in 20 of the *post-mortem* records, in which pneumonia proved fatal on the thirteenth day.

When defervescence failed to take place about the fourteenth day the protracted course of the disease was usually due to the occurrence of intestinal or pneumonic complications. Diarrhœa became aggravated and prolonged the duration of the case for several weeks, or an exhausting attack was speedily followed by collapse and death. Intestinal hemorrhage increased the prostration of the patient, adding gravity to otherwise mild attacks and sometimes leading directly to a fatal issue. The suffering occasioned by abdominal distention appeared in some cases to be the cause of the failure to convalesce at the end of the second week; indeed death at a later period was occasionally due to exhaustion induced by a continuance of the abdominal distress. Peritonitis supervened in many cases, the mesentery becoming affected by the condition of the glands or the peritoneal coat of the intestines by the inflammatory processes in their interior tunics; but, more frequently, in cases protracted by the unfavorable progress of the abdominal lesions, the occurrence of exquisite pain, vomiting, hiccough, cold perspirations, collapse and death, indicated perforation of the intestine and the escape of its contents into the peritoneal sac.

With or without the continuance of diarrhœa the course of the disease was often prolonged by the development or aggravation of cough, pain in the chest, hurried breathing and the physical signs of pneumonitic processes. Patients subject to bronchial cough from the early days of the attack were specially liable to this complication; the mucous expectoration became purulent and bloody, sometimes viscid and rust-colored. In favorable cases the duration of the sickness was much lengthened by these attacks, and if no serious intestinal or cerebral symptoms were present, the lung disease assumed a prominence which led in many instances to a diagnosis of pneumonia by medical officers who had not observed the case from its commencement. In others in which an extensive and manifest implication of the lung was coincident with low delirium and great prostration the disease, in the absence of a knowledge of its previous history, was frequently reported as *typhoid pneumonia*.

Nevertheless, in most of the cases in which defervescence at the end of the second week was prevented by intestinal or pneumonic complications, a close study of the details of the daily record of progress reveals an effort on the part of nature to establish convalescence at that period. The tongue became less dry, the skin moist, the pulse less frequent, delirium subsided, or the patient was recorded as being more intelligent or less stupid or drowsy or as having passed a better night than usual. But this favorable change in such cases was transitory: with some aggravation of the existing cough, pain in the chest and accelerated respiration, or with increased tenderness and distention of the abdomen, with or without an exacerbation or recurrence of the diarrhœa, the tongue became again dry, the skin hot, and a febrile condition, proportioned to the extent and severity of the local lesions and the depressed vitality of the patient, was re-established.

When cerebral symptoms were specially prominent during the third week, the existence of serious intestinal lesions might not be manifested by their usual symptoms; generally, however, stools passed without the consciousness of the patient were loose and frequent and in a proportion of the cases hemorrhagic. Under similar cerebral conditions extensive congestion of the lungs or numerous foci of catarrhal pneumonia were at times developed without expressing their existence by local symptoms.

When complications prolonged the febrile condition into the fourth week the patient became greatly emaciated, his pulse rapid and weak and his prostration extreme. At any time during the course of the disease sudden death from failure of the heart's action or heart-clot was a possible occurrence. Fatal syncope not unfrequently attended the effort to rise to stool or followed the unconscious impulses of an active delirium. During or before this time there often occurred a swelling of the parotid glands, which usually terminated in suppuration and extensive disorganization, if the death of the patient did not meanwhile interfere with the progress of the local affection. Not unfrequently, also, at this time deafness and headache, both of which were often obscured by the presence of delirium or stupor, indicated the probable occurrence of inflammatory processes in the ear, a complication which sufficed of itself to prolong the apparent duration of the original febrile attack, for the untoward symptoms sometimes disappeared and convalescence was established on the free issue of purulent matter from the affected organ.

If the conditions mentioned did not prove fatal by the fifth week the activity of the morbid processes referable to the direct action of the typhoid poison in the blood appeared to subside; diarrhœa became less active or ceased; pneumonic symptoms improved; delirium and other cerebral manifestations abated. Sometimes the return of consciousness about this time, after many days of low delirium or stupor, gave rise to hopes of a favorable issue which were not realized, the patient dying shortly afterwards of asthenia but retaining his recently recovered intelligence to the last. In other cases the tongue became clean, usually of a lighter red than in health, and sometimes patched with white or yellow fur; the appetite returned, and the patient showed a languid though increasing interest in the affairs of life. But he was generally extremely prostrated, and bed-sores, which had formed latterly, were slow to heal and caused much suffering; in fact his condition was such that the slightest adverse influence was sufficient to precipitate a fatal issue.

Irrespective of the direct influence of the typhoid poison on the blood a morbid quality of this fluid necessarily resulted from the continuance of the febrile condition by its interference with the healthy action of the blood-forming and blood purifying organs. This

deterioration was occasionally manifested at a late period of the typhoid attack by the development of petechial spots and even of larger extravasations. Abscesses were formed in various situations, and sometimes these became gangrenous in character. Gangrene of the toes and feet, simulating that from frostbite and necessitating amputation, was recorded as a consequence of the typhoid affection.

Even in favorable cases convalescence was tedious, and in its duration generally proportioned to the severity of the antecedent attack. Muscular strength and mental power alike required a long period for the return of their former vigor. Nor was the convalescence progressive: Diarrhœa was a frequent and oftentimes dangerous accident. Chronic pneumonia resulting from processes set up during the febrile attack often proved fatal as a sequel. Pain in the muscles retarded the return to health, keeping the patient for months in hospital under treatment for so-called chronic rheumatism. Various paralyses also appeared in the list of the sequelæ. Rarely a well defined relapse occurred marked by the presence of rose-colored spots on the chest and abdomen, diarrhœa, tenderness in the right iliac region, tympanites, epistaxis, tinnitus aurium, deafness, delirium and such other symptoms as were present during the primary attack.

But an analysis of the symptoms presented by certain of the cases that have been submitted will be of more value than the above generalizations in conveying correct impressions of the typhoid fever which affected our troops.

TEMPERATURE.—At the present day the course of a case of typhoid fever may be represented by a temperature chart with a few notes to indicate the prominence of a particular class of symptoms and explain anomalous deviations in the temperature curve. This curve is generally divided into three stages: In the first, that of gradual accession or ascending oscillations, the temperatures on each morning and evening are about a degree of Fahrenheit's scale higher than those of the preceding day, but the morning temperature is usually about two degrees lower than the temperature of the previous evening. The daily rise begins about noon and reaches its height between 7 and 12 P. M.; the fall begins at midnight, and between 6 and 8 A. M. the lowest temperature of the day is recorded. The highest evening temperature is usually attained from the fourth to the eighth day, and is generally 104°, 105° or 106°. The second stage is that of stationary oscillations in which the morning and evening temperatures remain at about the same height on each day, the former being a degree or more lower than the latter. This continues in mild cases until about the twelfth day, when, coincident with absorption of the deposit in the intestinal glands, the morning remission is strongly emphasized, and the third stage or that of descending oscillations commences. During this stage the febrile heat is that of a declining remittent fever. In its latter part the morning temperature may be at or lower than the normal, rising in the evening considerably above it, and constituting an intermittent period in the defervescence of the typhoid fever. In more severe cases, with ulceration of the intestine taking place about the twelfth day, the second stage, that of stationary oscillations, is prolonged into the third week; but after that, in favorable cases, the temperature declines, as in the milder cases, by remitting and intermitting stages. Accidents and complications are manifested by deviations of the curve from this typical course.

A consideration of the thermometric chart and of its anomalies in complicated cases shows the clinical thermometer to be an instrument of value not only for diagnostic but for prognostic purposes.* But the thermometer was unfortunately not in use in our hospitals during the war. The records do not show at a glance the gradual accession of the fever by evening increments and morning remissions, its vibratory continuance between its morning and evening maxima nor its decline by remittent and intermittent stages. To place on record an appreciative view

* Considering it in the former light, LIEBERMEISTER, in *Ziemssen's Cyclopedia*, American translation, New York, 1874, Vol. I, p. 77, says: "The diagnosis of fever can usually be made from the fever-curve alone, and this is true not only of the simple cases, but also of the obscure and complicated ones, provided that the physician is acquainted with the ordinary deviations." One of the rules of thermometric diagnosis deduced by WUNDERLICH from his observations, was that the disease in which the temperature has not risen in the evening of the fourth day to 39.5° Cent. (103.1° Fh.) is not typhoid fever.—See C. A. WUNDERLICH *On the Temperature in Disease*, Sydenham Society's Transactions, London, 1871, p. 293. But MURCHISON teaches that a diagnosis of typhoid must not be excluded if the temperature does not reach 103° Fh.—See his treatise *On the Continued Fevers of Great Britain*, second edition, London, 1873, p. 516. Considering the temperature as an element of prognosis, LIEBERMEISTER, *op. cit.*, p. 133, says that the histories of more than 400 cases in the hospital at Basil were tabulated with reference to the maximum axillary temperature, and that, "Of those patients in whom 104° or more was not observed, 9.6 per cent. died; of those in whom 104° was reached and passed, 29.1 per cent.; finally, of those in whose axilla the temperature rose to 105.8° and over, more than half died." And he insists also on the prognostic value of the daily fluctuations on the ground that a fever which shows notable remissions is more easily borne than one which remains at the same height. In this connection, E. SEGUIN's volume on *Medical Thermometry*, New York, 1876, p. 111, may be quoted: "The temperature indicates the *severity* of the disease about the middle of the second week, rarely earlier. A single observation does not do it, a whole day's observation gives it; but two or three days are still better. It indicates, best of all signs, the *irregularities* in the course; the *complications* that no other means can detect; a *relapse* after the patient has begun to recover; warns of the *tendency* towards death; *regulates the potency* of therapeutic operations; shows the *tendency to convalescence* with great definiteness, etc.; besides the most important fact that a large thermometric experience in typhoid fever has rendered possible the knowledge of its course and the certainty of its diagnosis and prognosis, which were absolutely impossible with the previous means of observation."

of the progress in a given case our medical officers had to observe and note the changes which took place in the general condition of the patient as manifested by the state of the surface, the tongue, pulse, respiration and muscular system, and by the extent and intensity of the cerebral implication as well as the influence exercised on the general condition by the progress of visceral and other local inflammatory processes. Enough of carefully detailed work of this character was performed, especially by the officers of the Seminary hospital, to authorize the statement that in their cases of typhoid fever the essential or primary fever tended to defervescence at the end of the second week. In many of the cases borne on the *Medical Descriptive Lists* which give little information other than that embraced in names and dates, improvement, quickly followed by convalescence, is noted about the fourteenth day. In one hundred and twenty-one recoveries from typhoid fever in Hospital No. 1, Nashville, Tenn., there were, according to a report of Act. Ass't Surg. B. BRANDIES, U. S. A., sixteen cases in which convalescence was pronounced at the end of the second week; these presented rose-colored spots and other symptoms regarded as pathognomonic. In twenty-five of the fifty-one cases of unmodified typhoid fever found in the records of the Seminary hospital the date of defervescence can be ascertained, and in eight of these, cases 2, 4, 7, 8, 9, 10, 13 and 27, a decided and permanent improvement was manifested about the period stated. But although defervescence may be said to have begun about this time, its progress was so gradual that convalescence, as marked by the ability of the patient to walk about the ward, was delayed for a week later. In these cases it must be assumed that the specific inflammatory processes in progress in the intestinal canal at this stage of the disease were so limited in their extent or degree that the constitutional disturbance accompanying them was insufficient to maintain the febrile condition, while at the same time the patient remained free from accidental or secondary lesions which, if present, would have been manifested by a maintenance or recurrence of the pyrexia.

It does not follow from the facts stated that the mild and uncomplicated cases of typhoid among our troops differed in their period of duration from those observed in civil practice before or since that time. Dr. JAS. E. REEVES, of Wheeling, West Va., in his delineation of the enteric fever of Virginia as presented to the practitioner shortly before the war, gives a table of the duration of the disease in sixty-four mild cases, *i. e.*, cases in which, in the absence of serious intestinal or pulmonary lesions, the attack ended with the cessation of the primary fever, or was prolonged, but in a mild form, by the existence of limited intestinal inflammation. The calculation was made from the time when the patients became unable to pursue their ordinary vocations to the cessation of febrile symptoms and the return of appetite. The duration was from nine to fourteen days in twenty-four cases, from fifteen to eighteen days in thirty-seven and over eighteen days in three cases.*

Observations of this kind were open to error at both extremes of the period. The insidious approach of the disease in many cases rendered the date of onset obscure, and in the absence of more delicate means of determining the cessation of the febrile movement than were used by our medical officers during the war, and by our medical men before that time, it was impossible to assign a date in all cases as that on which convalescence was established. The return of the patient to the state of health was so gradual and unmarked by striking phenomena that arbitrary lines had to be drawn. Thus, LOUIS considered the patient convalescent when he commenced to eat a little bread.† But on the other hand the onset was often distinctly marked by chills and other notable bad feelings, as headache, pain in the limbs and weakness, and although the date of convalescence might not be indicated with certainty, there was usually no difficulty in assigning a particular day as that on which the patient showed the first manifestations of improvement.‡

Since the war the duration of mild cases of typhoid fever, as usually stated, is three

* *A Practical Treatise on Enteric Fever*, by JAMES E. REEVES, M. D., Philadelphia, 1859, p. 102 *et seq.*

† CH. A. LOUIS, *Recherches Anatomiques, etc.*, t. II, note to page 12.

‡ Dr. AUSTIN FLINT in his *Clinical Reports on Continued Fever*, Buffalo, 1852, p. 116, argued that the day of convalescence might be determined from the general symptoms with sufficient accuracy for all practical purposes. "If a febrile movement, as determined by the heat of the skin, acceleration of pulse, etc., have ceased, clearness of the intellect returning, with refreshing sleep, and the patient has a desire for and a relish of food, he may be pronounced convalescent. Some one or more of the above conditions, in some instances, may be wanting, and, still, the other circumstances be such that convalescence may be properly declared. Judgment and some experience are requisite to decide correctly; and with every qualification on the part of the observer, it will not infrequently be a matter of some doubt as to the particular day which should limit the termination of the febrile career. Different practitioners would not fix upon the same day in all cases, owing to differences in the mode of estimating the circumstances upon which the opinion is based. Perfect exactitude and entire uniformity, in short, as respects this point, are not practicable; and yet sensible physicians, in the majority of instances, will act with sufficient correctness for all practical purposes."

weeks, or three periods of five or more days, corresponding with the ascending, stationary and declining stages as marked out by thermometric observation. The clinical thermometer has defined the date of convalescence as that on which the temperature does not rise above the normal at the hour of its usual post meridian increase. This instrument, by exactly defining the close of the febrile movement, has added to the duration of the disease as stated by physicians; but at the same time, by determining with equal delicacy and exactitude the beginning of the period of defervescence, it has shown the accuracy of our medical officers in noting slight changes indicative of improvement in mild and uncomplicated cases about the end of the second week. In point of duration there was no difference between these cases and those that since then have been studied thermometrically by the profession.

Cases in which the disease ran a longer course may be divided into two classes. The first were characterized by the occurrence of a short interval between the commencement of the declension of the primary fever and the accession of a fever symptomatic of secondary lesions. The second presented no sign of improvement at the end of the second week, the symptomatic fever having been developed prior to the subsidence of the specific or primary attack. The former were usually cases in which the recurrence of the fever was due to a late development of pulmonary complications. The latter comprised those in which diarrhœa or in some instances pneumonic symptoms were prominent from an early period, as in 17, 26 and 39 of the seminary series. But sometimes the progress of the intestinal lesion was such as to permit a manifestation of temporary improvement to be shown about the usual time, an improvement which was speedily lost in the constitutional disturbance attending the progress of ulceration or sloughing of the agminated glands. Thus, in case 24, the tongue became moist on the thirteenth day, but the skin continued dry and the diarrhœa was prolonged until the twenty-ninth; in 47 a marked improvement was manifested on the twelfth day, corresponding with the occurrence of rose-colored spots, epistaxis and a moist condition of the tongue, but a mild degree of febrile action was continued for some time, and the case had a fatal issue by a sudden aggravation of the diarrhœal symptoms. In other instances the condition of the kidneys appeared to exercise an influence in the prolongation of the febrile movement: In case 28 a tendency to improvement about the fourteenth day was followed by fever symptomatic of inflammatory processes in the intestines, kidneys and lungs; in 12 the fever declined in part at an earlier date than the fourteenth day following, convalescence was delayed until the twenty-eighth day, a result chiefly due, so far as indicated by the symptoms, to the condition of the kidneys.

Pulse.—The pulse during the primary fever was not much accelerated. In many cases it ranged from 80 to 90, in others from 90 to 100, but it seldom rose above 100 per minute, even when the fever was at its acme. Thus in twenty-seven of the seminary cases the pulse did not exceed 100 at any period of the attack, while many, characterized during their later stages by frequency of pulse, presented a less frequent beat in the progress of the primary fever. In eleven of the twenty-seven cases the rate did not exceed 90; in seven the rate was between 90 and 100, but did not reach the latter number, while in nine 100 was reached but not exceeded. This slightly accelerated pulse was generally quick; hence the febrile condition was manifested rather by sharpness or increased impulse than by acceleration. It was sometimes small and weak, rarely full and strong, and if so, only for a short time preceding the appearance of the eruption or the occurrence of a free perspiration, which changed its rate and quality. When defervescence took place toward the close of the second week, the pulse lost its sharpness, becoming at the same time less frequent and more feeble, but regained strength, volume and sometimes frequency as convalescence advanced. When the primary fever was associated with a pulse-rate of 110 or more, there was generally a notable suffusion of the face, injection of the eyes and not unfrequently epistaxis, especially if the pulse, as in cases 12, 21 and 28, was at the same time strong and full. In seven of the seminary cases in which the pulse-rate exceeded 100, the acceleration was chiefly due to the primary fever, although sometimes, as in 47, the prostration caused by an active diarrhœa rendered the pulse rapid and weak at an earlier period than usual.

It would seem from these analytical results that in the typhoid cases of the war, as illustrated by those treated in the Seminary hospital, the average frequency of the pulse was considerably less than in the disease as it attacks civilians. MURCHISON has published some statistics which may be used in effecting the comparison.* The pulse exceeded 100 in 85 per cent. of the cases mentioned by him, but in only 43 per cent. of the Seminary cases. Most authorities agree that, excluding certain exceptional instances, the gravity of the disease is proportioned to the frequency of the pulse.† This would imply that the typhoid of our soldiers was of a milder type than is generally encountered, a deduction which is negatived by the positive testimony furnished by the percentage of fatality. The relatively slow pulse must therefore be attributed to some other cause than the mildness of the affection.

The Seminary hospital records show that when the febrile condition was prolonged beyond the second week the pulse became frequent and feeble in proportion to the increasing prostration. Symptomatic fever was manifested by quickness, but occasionally, and especially in some pneumonitic cases, the frequent pulse was full, soft and irritable. During the persistence of low delirium, subsultus and involuntary passages, the pulse was rapid, 120–130, small and weak; occasional exceptions occurred, as in 48, in which, with typhoid delirium, it was 95 shortly before death. Usually in delirious cases the condition of the pulse was an index of the patient's strength; but in some exceptional instances, as in 42, violent muscular efforts were associated with an almost imperceptible radial beat.

Perspirations and epistaxis occurring at the end of the second week lowered the pulse-rate and lessened its impulse; but their recurrence at a later date, especially if frequent and profuse, induced the rapid pulse of typhoid prostration. This prostration, when the disease was prolonged by secondary fever, was as manifest in the action of the heart as in that of the voluntary muscles. Slight exertion was followed by aching in the limbs, great weariness and exhaustion; the patient's legs trembled under his weight when he rose from bed, and when unable to rise tremors might be seen in the movements of the hands or in the protruded tongue. Correspondingly the pulsations at the wrist became weak undulations that could not be counted; hypostasis occurred in the lungs and the activity of the capillary circulation in the skin became diminished; the hands and feet were cold and clammy, the face pale and features shrunken. This condition of prostration is well outlined in case 31 of the *post-mortem* records. In some instances, as in 150 of the same series, collapse occurred with a slow and imperceptible pulse. Many of the sudden deaths recorded as having taken place when the patient was at stool or subsequent to some violent delirious

* He states that the pulse exceeded the normal standard of frequency in all but one of one hundred cases. It exceeded 90 in ninety-seven cases; 100 in eighty-five cases; 110 in seventy cases; 120 in thirty-two cases; 130 in twenty-five cases; 140 in ten cases; and 150 in two cases.—*Op. cit.*, p. 518.

† Dr. JAMES JACKSON, in his *Report on the cases of typhoid fever or the common continued fever of New England, which occurred in the Massachusetts General Hospital from September*, 1821, *to the end of* 1825, Boston, 1838, gives on page 41 the following table of the frequency of the pulse in this fever:

Average of----	Least frequent pulse.	Most frequent pulse.
In 290 cases, in all of which the pulse was sufficiently noted	77.07	106.44
In cases which terminated favorably, taken alone	74.16	102.68
In those which terminated unfavorably, taken alone	91.88	129.29
In the males among the fatal cases	85.50	124.29

LIEBERMEISTER states that the frequency of the pulse runs a course parallel to the height of the temperature.—*Op. cit.*, p. 82. MURCHISON gives positive data on this question: "As a rule those cases are most severe in which the pulse is quickest, and the prognosis is usually bad when, in an adult, the pulse persistently exceeds 120. Of thirty cases where I found the pulse never exceeded 110, not one died; whereas of seventy cases where it was above 110, twenty-one, or 30 per cent., died; of thirty-two cases where it was above 120, fifteen, or 47 per cent., died; of twenty-five cases where it was above 130, thirteen, or 52 per cent., died, and of ten cases where it was above 140, six died. Two of the patients who recovered after the pulse exceeded 140 were under ten years of age."—*Op. cit.*, p. 519. But LOUIS, in considering the fact that in 8 of 41 fatal cases and in 21 of 57 severe but not fatal cases the pulse did not rise above ninety beats per minute, came to the conclusion that a moderately accelerated pulse is of favorable omen as suggesting that the attack will not be prolonged, while a slow pulse awakens fear as to the length of the disease and its issue.—See his *Recherches*, t. II, p. 276.

effort are attributable to failure of the heart's action. Death from this cause also occurred unexpectedly during convalescence.

Epistaxis was noted in sixteen of the fifty-one Seminary hospital cases. In six it occurred during the early part of the attack and in three during the second week: in none of these did the loss of blood appear to influence the progress of the disease. **Nevertheless, in seven cases in which it took place or recurred at the end of the second week or later, a favorable change was commenced.** These cases were Nos. 11, 18, 25, 28, 36, 45 and 49. In the last three cases, as also in the relapse, 46, the epistaxis was closely associated with general symptoms of defervescence. In 28 and 47 the improvement was of a transitory character, as the secondary affections ultimately caused death. In 45 the loss of blood was so profuse that the pulse could not be counted; yet the patient rallied satisfactorily. The improvement in this case must be referred to a free discharge of pus from the ear rather than to the epistaxis, for previous losses had been followed by no amelioration of the patient's condition.

This proportion of cases is similar to that recorded in civil life by Flint and Murchison;* epistaxis was, however, of more frequent occurrence in the experience of Louis.† In many cases the quantity lost was so small as to be without influence on the condition of the patient: sometimes it amounted only to a few drops. When it took place in the early period the febrile accession was uninterrupted by its occurrence. The cases in which there is a probable connection between the loss of blood and the defervescence which speedily followed are of interest in view of the positive assertions of so many observers that epistaxis occurs without relief to the symptoms.‡ When the febrile movement was at its height, the pulse full and comparatively strong, the skin hot, cheeks flushed and eyes injected, it is difficult to dissociate the flow, if sufficient to create an impression on the system, from the improvement which followed. But defervescence was in these cases about to commence, and would have commenced irrespective of the occurrence of the epistaxis, as is indicated by the progress of those cases in which the fever declined without an accompanying loss of blood. The epistaxis must therefore be regarded as essentially a coincidence which may have emphasized the first remission of the declining stage of the fever and rendered the improvement that subsequently followed more marked than it would otherwise have been.

Of the few *post-mortem* cases which are precluded by a summary of symptoms, epistaxis is mentioned only in six, in all at a late period of the disease. The loss of blood does not appear to have in any instance materially affected the progress of the case; the quantity was not estimated, but in 17 and 207 it would seem to have been small and mainly induced by the patient picking the nostrils with his fingers.

Condition of the Skin.—In the majority of the Seminary cases the skin is said to have been hot and dry, and this condition persisted to the subsidence of the primary fever.

In the typhoid cases of civil life the skin is not unfrequently moist or perspiring, especially at night or towards morning, even before the occurrence of the strongly marked remissions which indicate the decline of the fever.§ There is here a distinction between the typhoid fever of the war and the disease as seen in civil practice. But it may be said that this distinction is an arbitrary one—that the Seminary cases did not in fact present this continued dry state of the skin, but only that proportion of them which has been separately submitted as illustrative of uncomplicated typhoid. If, however, those cases which

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* In Flint's fatal cases epistaxis in 8 of 30 cases. Usually it was slight, occurring at an early period, and producing no appreciable effect on the progress of the disease.—*Op. cit.*, p. 97. Murchison noted its presence in 15 of 56 cases: "All observers agree," he says, "in stating that the bleeding is rarely if at all followed by amendment in the symptoms, while on the other hand it may be so profuse as to be the immediate cause of death." Several examples of fatal epistaxis came under his notice.—*Op. cit.*, p. 563.

† Louis says that the epistaxis was less frequent in mild than in severe cases. It was present in 11 of 24 mild cases; 27 of 34 severe cases, and 11 of 16 fatal cases, and has usually occurred without the slightest relief to the symptoms.—*Op. cit.*, t. II, p. 219.

‡ See the opinions quoted at the bedside.

§ Louis says that the skin was almost healthy in one-fourth of the mild cases, and moist in the remainder, at the commencement of the disease; after the eighth day perspiration was slight in the mild, but not in the severe cases; although the heat was not intense, especially at first, it was [illegible] it is moist and even natural with some, but the other [illegible]

were characterized by softness of the skin, moisture or free and recurring perspirations, be closely examined, the majority will be found to have presented other symptoms of malarial implication. Moreover, in many of these the perspirations had a notable influence on the pulse and general febrile condition; while most authors agree that the occasional moisture on the skin of typhoid patients does not exercise any controlling influence on the course of the fever.* It would seem, therefore, that a hot and dry condition of the skin was in reality a characteristic of the cases of unmodified typhoid among our soldiers.

During the continuance of the primary fever the rose-colored eruption made its appearance usually from the seventh to the fourteenth day. The skin rarely became cool or moist before the eruption appeared; but it frequently happened, especially in the milder cases, that defervescence associated with free perspiration coincided with the discovery of rose-colored spots on the chest and abdomen.

In cases prolonged by the existence of secondary lesions the skin generally retained its febrile heat and dry husky state; but at times a moist condition alternated with this, and free perspirations were not uncommon. In this respect these cases did not differ from similar cases of typhoid as delineated by medical authorities. The perspirations were sometimes of nightly occurrence and so copious and exhausting as to suggest the necessity of special medication for their suppression. Occasionally improvement dated from their occurrence, but in other instances their favorable import was not so manifest, although, as will be shown hereafter, they may have exercised a beneficial influence on the morbid processes in progress in the intestinal canal. In cases characterized by extreme prostration, as in 47 of the Seminary cases, and in 19, 150 and 199 of the *post-mortem* series, profuse perspiration attended the fatal issue.

An eruption of ***sudamina*** was occasionally noted as an accompaniment of the perspirations, especially of those occurring at the beginning of defervescence. These miliary vesicles are mentioned in thirteen of the fifty-one cases, and in eight of these they were associated with a moist or perspiring state of the skin. It does not appear, however, that this condition was essential to their development, for in four of the cases, 7, 25, 30 and 45, the skin was not moist at the time of their appearance, nor had it been moist at any previous period of the attack, and in 46 the skin was dry at the time of the eruption and had been dry for some days before its appearance.

This eruption may not be regarded as of special significance, although it occurred occasionally as one of the concomitants of defervescence, for it often appeared in the history of fatal cases. It was present in case 39 of the necroscopic series; the breast and abdomen were covered with sudamina in 163, while the patient was in a comatose condition from which he did not recover; the vesicles were noted as a *post-mortem* appearance in 170; they were present also in other cases, as in 7, 38 and 118.

There is nothing in these facts to suggest a difference between the typhoid fever of our camps and that described by medical writers. Most authors and observers refer to sudamina as of more frequent occurrence in this than in any other acute disease.† The eruption is therefore regarded as possessing diagnostic value in so far as it tends to confirm a diagnosis already made. As an element of prognosis it is evidently valueless; although the opinion

* Dr. Flint found that free perspirations occurred once, twice or several times in 33 of 60 cases.* These were exclusive of the instances in which sweating was coincident with or occurred shortly before convalescence or as a precursor of death. He at first concluded that "we are not warranted in predicating expectations of speedy convalescence or of recovery upon either of these symptoms [moisture and free perspiration] disconnected from other circumstances, nor do these results afford any grounds for supposing that to induce moisture or sweating by therapeutical means will be likely to prove beneficial." This conclusion was derived from the observation that a moist condition of the skin was in a large proportion of instances not succeeded at a short interval by convalescence, and that perspirations occurred in nearly one-half of his fatal cases. But he subsequently changed this opinion on finding that free perspirations were followed by a fall in the pulse-rate, and that the average severity, as manifested by the pulse and the duration of the attack, was less in cases characterized by an occasional moist condition of the skin than in the febrile cases generally.—*Op. cit.*, p. 333. Unfortunately his observations on this head were not extensive. The opinion of Liebermeister, given in the last note, is that of the profession generally. See also page 295, *infra*, on the probable influence of perspirations on the diarrhœa.

† Enoch Hale, in his *Remarks on the Pathology of the Typhoid Fever of New England*, read at the annual meeting of the Massachusetts Medical Society May 29, 1839, and published in the Transactions of the Society, says, p. 193, that this eruption was present in 75 of 197 cases treated in the Massachusetts General Hospital, absent in 15, while in 107 the records made no reference to its appearance. Murchison noted it in about one-third of his cases, p 515.

generally expressed by recent writers that it is associated with perspiration and has no special connection with the poison of typhoid fever may well be doubted.*

During the primary fever the face was generally flushed, a condition which in some instances was noted as aggravated at the evening visit. Sometimes the flush was described as dark-red or dusky, as in 19, 27, 28, 32 and 38 of the Seminary cases and in 17, 18 and 30 of the *post-mortem* series. At a later stage the face became pale and the features shrunken.

Rose-colored spots were observed in forty of the fifty-one cases treated in the Seminary hospital. They usually made their first and in some mild cases their only noted appearance just before the moistening of the skin and the abatement of the fever towards the close of the second week. The eruption may have been present in some of the eleven cases in which no record of its existence was made, for in one case, 1, the history is incomplete; in 2 and 5 the record begins about the period of defervescence; in 41 the patient died on the twelfth day from the effects of a fall; in 43 the record does not begin until the sixteenth day; in 19, 20 and 51 the patients were not admitted until late in the progress of the disease, and in 33 and 35 the results of the fever and not the fever itself were under observation; even in 13 there was time for the spots to have appeared and faded unnoticed, as the patient was not examined until the twelfth day. Thus in forty cases which were observed daily during the greater portion of the febrile continuance this eruption was present in all.

In the cases recorded in the books of other hospitals and on the medical descriptive lists the existence of lenticular spots is frequently noted, although more frequently, owing to insufficiency of detail, no mention is made of their presence; but only in two cases, 43 and 330 of the *post-mortem* records, is their absence specially reported. In the former the patient was not examined until the twelfth day; the latter is therefore the only case in which it is stated that rose-colored spots were not observed, although the patient was under medical supervision during the whole course of the disease. It is worthy of remark, however, that the soldier in this exceptional case was treated in quarters for six weeks as a case of bronchitis before he was taken into hospital; that after his admission the solicitude of his medical attendant was mainly aroused by the condition of the pulmonary mucous membrane, and that the diagnosis of typhoid fever was consequent on necroscopic revelations. Under these circumstances the statement that rose-colored spots were not observed in the progress of the case does not have a positive value.

We must conclude from these facts that cases of typhoid fever which were not characterized by the appearance of rose-colored spots were exceptional;† and that our medical officers were fully warranted in regarding the eruption as pathognomonic, since its occurrence had not been observed in connection with any other disease.‡ That it was looked for

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* Louis recognized that the miliary vesicles were not always proportioned to the perspiration; in fact, he sometimes found them numerous when there had been little perspiration and absent when there had been much. Moreover, in forty cases of acute disease other than typhoid fever, attended with free perspiration, sudamina were found in but three cases, although special attention was directed to their detection. His observations led him also to consider them more numerous in severe than in mild attacks of typhoid fever. He therefore looked upon these vesicles as of much importance in the history of the fever, conceiving them to be dependent on some unknown condition of the skin which was more pronounced in serious than in slight cases.—*Op. cit.*, t. II, p. 244; see also second ed., 1841, t. II, p. 110. This opinion no doubt gave rise to the impression that they were of critical importance. Some practitioners have looked for them with anxiety about the period of defervescence; Reeves, p. 59, instances this fact, although himself attaching little importance to the eruption. Indeed the general tenor of medical opinion regards it as having no special significance: See Chomel, p. 25, and Wood, p. 320. Liebermeister says that it is found in patients who have not perspired very freely, p. 94. Murchison, on the other hand, p. 515, believes that it usually appears with perspirations, and is, perhaps, equally common in all febrile diseases attended with sweating. M. J. Vibmontois, in his thesis *Du Diagnostic et du Traitement de la Fièvre Typhoïde*, Montpellier, 1877, embodies the present view of the eruption as deduced from the literature of the subject, where he says: "Les sudamina ne constituent pas un caractère spécifique de la maladie: ils n'ont pas une grande valeur diagnostique; on les a rencontrés dans beaucoup d'autres maladies: pneumonie, rhumatisme articulaire aigu. Cette éruption est tout simplement liée aux sueurs plus ou moins abondantes du malade." J. C. Wilson has expressed the prevailing opinion in this country in his *Treatise on the Continued Fevers*, New York, 1881, p. 169, where he says: "They [the sudamina] are very common in typhoid fever, but are without specific character, and occur with perhaps equal frequency in other febrile affections." In the absence of observations on the frequency of sudamina in acute diseases, such as intermittent fever, pneumonia, acute rheumatism, etc., attended with perspirations, the statement of their connection with perspirations is hardly warranted; while the acknowledged frequency of the eruption in typhoid fever, and its appearance in that disease when the skin is not even moist, seems to authorize the doubt which has been expressed in the text.

† Louis found the *taches roses lenticulaires* in 26 of 35 fatal cases, but acknowledged that they may have been present in more than this number, as many of the patients came to the hospital at a period when perhaps the spots had disappeared. In 57 severe but not fatal cases they were present in all but 3, in two of which the patients did not come under observation until late in the disease, and in the third no examination of the surface was made except between the seventh and eleventh days,—t. II, p. 231. Enoch Hale believed them to be always present. He says—in his *Remarks on the Pathology of the Typhoid Fever of New England*, Trans. Mass. Med. Soc., 1839, p. 191—"Of the 197 cases that I have analyzed for this paper, rose-spots are recorded in 177. In the greater part of the remaining 20 it is apparent from the record that sufficient attention was not given to them to render it by any means certain that they did not exist. Most of the omissions are in the earlier part of the period I have specified, before the importance of this appearance, as a diagnostic mark, was fully appreciated. In a few cases the patient was brought to the hospital at too late a period of the disease for them to be visible. With this exception I have, for a long time past, seen no case that could with any propriety be regarded as decidedly the typhoid fever, in which rose-spots were not found, and I think it is not assuming too much to consider them a constant attendant upon that disease." In three series of cases reported by Dr. Flint the eruption was present in 23 of 30 cases, in 12 of 29 cases and in all of 14 cases. Bartlett rarely failed to find it when properly looked for,—p. 60. According to Murchison, these spots were observed in 4,606 of 5,988 cases or in 76.92 per cent. of the typhoid cases admitted into the London Fever Hospital during twenty-three years, but in some of the remaining cases the fact of the spots not being observed was perhaps due to their not having been looked for with sufficient care,—p. 511. Reeves seldom failed to find them at some period of the disease,—p. 57. Liebermeister says they are frequently entirely wanting in slight undeveloped cases; but "whether there are well developed cases without any roseola throughout the entire course of the disease I am unable to decide; in all cases which I examined sufficiently often, I have found at least a few spots,"—p. 93.

‡ Chomel—*Leçons de Clinique Médicale*, Paris, 1834—probably influenced by the positive statement made by Louis in 1829, as to the occurrence of rose-spots in certain diseases other than typhoid fever, speaks of their eruption,—p. 21—as "aussi rare dans les autres affections aiguës qu'elle est commune dans la fièvre typhoïde, et que dans les cas rares où on l'observe dans le cours d'une pneumonie, d'une entérite, ou d'autres affections aiguës, jamais

with care in febrile cases is evidenced by such reports as 7 of the 27th Conn. record and 40 of the Seminary series, in which one or two rose-spots were recorded as having been discovered on the chest, or 11 of the 19th Mass., in which one or two equivocal spots are said to have been seen. Occurring in connection with an otherwise satisfactory complexus of symptoms, the presence of a few doubtful spots might be accepted as constituting a specific manifestation; but in obscure cases such an appearance could hardly be regarded as of diagnostic value. CHOMEL did not consider the eruption present unless fifteen or twenty spots appeared.* When LOUIS first looked for these *taches roses lenticulaires* in acute diseases other than the typhoid affection, he discovered them in twelve of fifty cases—once in two cases of pneumonia, twice in twelve of diarrhœa, once in three of rheumatism, three times in eight of catarrh, once in four of gastro-enteritis and four times in ten of gastric embarrassment;† but he afterwards concluded that he had in these instances mistaken ordinary pimples for the spots in question.‡ Since this close observer had to acknowledge an error of this kind, some hesitation may be shown in accepting one or two spots as a specific eruption unless the diagnosis has been completed, irrespective of their presence, by the concurrence of other symptoms.

The spots generally presented their usual well-known characters. They were circular or somewhat oval in outline, half a line to two lines in diameter, rose-red in color, slightly elevated and with well-defined margins; they disappeared on pressure. Their customary site was the chest and abdomen, but occasionally they were noted on the back and thighs. They were observed for the first time usually during the second week, but in some, as in cases 7 and 17, they appeared as early as the sixth day.§ In many instances the records take note of but one crop, which faded as defervescence progressed; fresh spots may, however, have erupted in these cases without having been noticed or recorded by the medical officer, for his interest would naturally have diminished as the favorable issue of the case became a certainty. In mild cases, when the spots appeared at an early day, fresh crops were developed during the second week as those first formed were fading. In prolonged cases a succession of spots was the rule, lasting, as in case 37, from the thirteenth to the thirty-first day, or as in 26, from the eleventh to the thirty-fourth day.

It does not appear that this eruption had a prognostic value or was connected with any special condition of the skin, for although in some, as in the case last mentioned, its recurrence corresponded with fever, delirium and diarrhœa, in others the symptoms during its continuance were by no means grave: In 37, rose-colored spots and abdominal tenderness were for some days before convalescence the only symptoms explanatory of existing weakness and disability, while in 4 the patient was able to walk and was in a fair way to recovery when the eruption appeared on the fourteenth day. Nor did the number of spots present at a given time bear any relation to the character of the attack. The eruption was profuse

elle n'est aussi abondante que dans la fièvre typhoïde, on concevra pourquoi nous attachons à cette éruption une si grande valeur pour le diagnostic de la fièvre typhoïde." LOUIS himself, as indicated in the text, after a longer experience in the study of the rose-colored spots, concluded that he had mistaken simple pimples for this eruption in the cases mentioned; for, after the publication of the first edition of his work, he vainly sought for the spots in patients affected with other acute diseases. MURCHISON, after describing the specific characters of the rose-colored spots, says, p. 513—"At the London Fever Hospital I have had occasion to examine many thousand cases of acute diseases of every form, and my opinion is that an eruption which presents all the characters above mentioned is peculiar to enteric fever."

* CHOMEL, page 18. † LOUIS, Ed. 1829, t. II, p. 242. ‡ Ed. 1841, t. II, p. 107.

§ MURCHISON says the spots appear from the 7th to the 12th day (inclusive)—p. 511. According to CHOMEL, p. 20, they erupted in twenty-seven cases as follows: In two cases from the 6th to the 8th day; in thirteen from the 8th to the 15th day; in seven from the 15th to the 20th day; in four from the 20th to the 30th day, and in one on the 37th day. JENNER, *On Typhoid and Typhus Fever—Monthly Jour. Med. Science*, Edinb., Vol. IX, 1849, p. 676—has expressed the opinion that except in cases of relapse rose-spots never appear after the 30th day, but MURCHISON met with several instances in which they appeared daily as late as the 35th day, and in one mild case he noted the almost daily appearance of fresh spots from the 14th to the 60th day—p. 547.

in the mild case 12 of the Seminary hospital as well as in 14 of the *post-mortem* series; it was scanty in the mild cases, 9 and 40 of the former, and equally scanty in cases 31 and 41 of the latter series.*

Occasionally the eruption was of a darker color than usual: In 27 and 28 of the Seminary series it was dark-red in color and did not disappear on pressure; in these cases the deeply flushed face, suffused eyes, heavy expression and intensity of the cerebral symptoms were suggestive of a typhous condition. In other instances the spots did not present what was regarded as their normal characteristics: In 2 of the *post-mortem* series some red blotches were observed on the face, arms and chest, and in 6 of the Seminary cases the typhoid rash was preceded by an anomalous eruption. Excluding the duskiness of the spots presented by certain of the cases there is nothing in these facts to base a distinction between the typhoid cases of the army and those seen elsewhere. FLINT observed that some typhoid spots disappeared but partially on pressure,† and many authors refer to eruptions which precede or accompany the rose-colored spots.‡

In none of the records of typhoid fever is mention made of the pale-bluish spots, the *taches bleuâtres* of the French writers.

Petechiæ seldom appeared on the skin. They are mentioned in case 32 of the Seminary series, in which they were noted on the fifteenth day, or one day after the eruption of the typhoid spots; this case recovered. They were also noted in 21, 36, 45 and 49 of the *post-mortem* series, situated usually on the chest and abdomen, but in the last-mentioned case extending to the thighs; their number was not recorded. Ecchymotic spots of larger size, reported as *vibices*, appeared at a late period of the attack in several cases, generally during or after the fourth week. They must be considered a grave prognostic; of the Seminary cases in which they were noted three cases, 24, 36 and 49, were severe, and three, 46, 47 and 51, were fatal.

As the rarity of ecchymotic spots in typhoid fever is generally conceded,§ the frequency

* Following LOUIS, who observed that in three-fourths of his fatal cases the rose-colored spots were few in number, Ed. 1829, t. II, p. 231, A. P. STEWART—in his article entitled *Some considerations on the nature and pathology of typhus and typhoid fever, applied to the solution of the question of identity or non-identity of the two diseases. Edinburgh Med. Jour.*, LIV, 1840, p. 326—was led to consider that the more copious the eruption the less the severity of the case. He found the spots few in number or absent, although carefully looked for, in a deadly epidemic which prevailed in Glasgow in 1836, and afterwards observed them more or less numerous in sporadic cases presenting a much less intense form of the affection. But after further inquiry he came to the conclusion that this opinion, although to a certain extent correct, was not of general application. THOS. B. PEACOCK observed—*Medical Times and Gazette*, XXXIV, London, 1856, p. 182—that the cases in which there is a copious eruption are of a sthenic type and terminate favorably; but he acknowledges that in many cases in which there is no eruption at all the disease is also mild, while in others it is severe and often proves fatal. MURCHISON disposes of the question by the statement that there is no relation between the presence or absence of the eruption and the severity of the fever,—p. 512. In this country DR. JAS. E. REEVES considered that the number of spots diminished in proportion to the extent of the intestinal changes. WILSON summarizes the prevailing opinion of the profession at the present day in his assertion that—"There is no relation between the abundance of the eruption and the severity of the symptoms,"—p. 168. As REEVES' experience was drawn from the country districts of a State, Virginia, which afterwards furnished the Seminary hospital with its typhoid cases, his remarks on the eruption may be of interest: "In mild cases of the disease, in which the diarrhœa is not troublesome, I have several times seen the patient spotted from head to foot. At other times the eruption was principally confined to the abdomen, chest and inner part of the thighs. In other instances it was scattered upon the extremities, even to the fingers and toes, while upon the trunk it was either entirely absent or only a spot here and there to be found. Again I have seen it thickly set upon the back; and I am inclined to believe that it more frequently occupies this locality than is generally supposed. It is not so conveniently sought for in this region as upon the abdomen, chest and extremities; and therefore results, perhaps, the rarity of its being spoken of as occupying this region. All this I have observed in mild cases of the disease. In the intermediate form of the disease I have occasionally observed it largely spread over the different parts of the surface, but this was rare when compared with its frequency in milder cases. In this form it is mainly confined to the abdomen, with, perhaps, a patch now and then to be seen upon the breast and shoulders. It is also somewhat later in its appearance than in the mild form. In cases of still greater severity—those belonging to the malignant form—it is, as a general rule, still more tardy in its appearance, and does not occupy as much surface at a time as is usually seen in the preceding forms. It has been in the worst cases of the disease that I have observed the smallest amount of this eruption. In a very few instances I have seen it thickly spread upon the abdomen, chest and shoulders, with a few spots on the back and thighs; but in the majority of severe cases it occupied only the region of the abdomen. It does not always make its appearance upon all of the several parts of the surface named at the same time, but comes out in successive crops—sometimes abundant in one region, and at other times only one, two, three or four spots in the next locality. When the first patch begins to fade a second will make its appearance, and so on, until the eruption ceases or is lost in the larger and more livid discolorations known as petechia, which in very grave cases show themselves. The time occupied in this fading and recurrence of the eruption may vary from five to twenty-five days. The greatest duration of this process I have noticed, almost invariably, to occur in those cases which passed through the milder forms to the malignant, and particularly in those cases which terminated in death. In the majority of these cases but few spots could be found at a time after the most careful search."

† FLINT, *op. cit.*, p. 322.

‡ Thus HALE—p. 192—says that in some instances there are interspersed with the rose-colored spots true papulæ of the same color but larger, slightly elevated and hardened and not disappearing on pressure; they are generally quite numerous, extending to other parts of the body than the abdomen and chest, and are occasionally attended with considerable itching. JENNER—*On the identity or non-identity of Typhoid and Typhus Fevers*, London, 1850, p. 12—called attention to a pale and delicate scarlet tint of the skin which sometimes preceded the typhoid eruption but never lasted more than a day or two; the skin resembling in tint that of a person shortly after leaving a hot-bath.

§ MURCHISON met with petechial spots and vibices in rare cases, several of which recovered. To support his own testimony he cites TROUSSEAU, *Clinique Médicale de l'Hotel Dieu*, Paris, 1861, p. 159, as having recorded a case in which there were extensive vibices,—p. 515. WILSON, who has given to the profession in this country the latest complete view of the fever, says that true petechiæ are rare, and does not even refer to the occurrence of larger ecchymotic patches.

of their appearance in these Seminary hospital cases suggests a difference between them and the typhoid fever cases of civil life.

Continued pressure and the lowered vitality of the patient led to the formation of ***bed-sores*** over the sacrum, trochanters and other bony prominences during or after the fourth week of the attack. Cases 24, 28, 36 and 51 of the Seminary records may be mentioned as illustrations; but these observations are perhaps equally common in the clinical history of typhoid as seen elsewhere.*

Herpes labialis is not mentioned as having been present in any of the cases.†

A ***peculiar odor*** from the body was noted in case 19 of the Seminary records;‡ but the ammoniacal odor from the patient in some of the *post-mortem* series was probably due to involuntary micturition.

The Nervous System.—*Headache* was the most frequent cerebral manifestation observed in cases of unmodified typhoid fever. It is mentioned in thirty-six of the Seminary cases; *delirium* was recorded in twenty-nine, *deafness* in twenty-eight, more or less *stupor* in twenty-seven, *drowsiness* in fifteen, *tinnitus aurium* in sixteen, and *dizziness* in eleven. But these numbers do not express the relative frequency of such cerebral developments. When delirium alone was noted, it is probable that at some period of its course the case presented headache, drowsiness, hebetude of mind or deafness, which was not recorded or perhaps observed on account of the greater prominence of the delirious condition and the higher importance attached to it as an indication of gravity.

Headache was generally frontal; but in 38 of the Seminary series its seat was the temples. It was usually dull; in case 1 it was reduced to a mere sense of fullness, and in 13 to a heaviness over the eyes; but in many it was severe and distressing. Head pain was a symptom of the period of accession; in but one case, 40, is it expressly stated that there was no headache during this period. Occurring after or without chilliness it was accompanied by pains in the limbs and back, thirst, anorexia and other general symptoms of the febrile condition. It usually persisted during the first week, and was not unfrequently associated with dizziness, restlessness and inability to sleep. During the second week it subsided or was obscured by drowsiness, mental hebetude or delirium, which set in about that time. It is probable that in most instances there was a real abatement of this pain, for exceptionally, in some, as 22 and 25, it was a source of complaint when delirium was present.§ Sometimes headache was reported at a later stage: in 29 it occurred without delirium in the third week, subsiding as the last crop of eruption faded, and in 47, in conjunction with dizziness and deafness, it preluded a recurrence of delirium.

Drowsiness, which generally terminated the period of wakefulness and headache, was developed gradually; the patient became dull and stupid and was aroused with increasing difficulty. Frequently tinnitus aurium and deafness were associated with this mental dulness. In more severe cases delirium, usually of a quiet and asthenic character, was developed; drowsiness during the day gave place to restlessness at night, the patient muttered in his sleep and was incoherent for some time after he awoke, and, afterward, this condition of muttering delirium became continuous.

Delirium was present in twenty-nine of the fifty-one cases—in eight of ten fatal cases and in twenty-one of forty-one recoveries. In the fatal cases, 44 and 46, in which delirium was not reported the records are not carried out in detail to the end. Of the twenty favorable cases in which there was no delirium, the cerebral symptoms in two cases, 3 and 14, consisted of headache only; in 7 and 12 there was also drowsiness, to which tinnitus

* "Vitality is so feeble in the skin that blistered surfaces often slough, and gangrenous eschars are produced in parts exposed to continued pressure, as over the sacrum and upon the hips."—Wood's *Practice*, Vol. I, p. 317.

† The rarity of *herpes labialis* in typhoid cases is acknowledged by Flint where he says: "An herpetic eruption about the mouth was observed in one case. Lest the occurrence of this symptom may suggest a suspicion that the disease was, in this case, *remitting* fever, in which herpetic eruptions in that situation are apt to occur, it may be stated that no doubt could exist as to the diagnosis, the characteristic *macula*, together with other distinguishing traits being present,"—p. 75.

‡ Chomel—p. 40—says the whole cutaneous surface exhales a fetid odor. Bartlett—p. 61—frequently noted a semi-cadaverous and musty odor, especially in the later stages. Flint—p. 213—was unable to satisfy himself as to the existence of this odor. "The sisters at the hospital, and some of the students, have frequently assured me that they were sensible of a distinctive odor arising from the bodies of fever patients under my charge, but I have always failed to verify, to my own satisfaction, this diagnostic. It would be assuming too much to distrust the ability of others to recognize the disease by the olfactory sense, and the probable as well as the more modest inference is, that the ill success which has attended my efforts is due to a want of sufficient acuteness to appreciate impressions received from that source." Wood says that a peculiar unpleasant odor often exhales from the body.—Vol. I, p. 317. Murchison's statement is that there is rarely any peculiar odor given off by the skin in enteric fever,—p. 518.

§ Louis argued that the cessation of headache on the development of somnolence or delirium is not always to be attributed to an incomplete perception, for many of his patients complained of pains in other parts of the body while giving assurance that they were free from headache,—t. II, p. 132.

was added in 2 and dizziness in 4, 13 and 18; dizziness and tinnitus were present in 8, stupor in 40 and 49 with dizziness in the former; deafness in 6, with tinnitus in 29, dizziness in 9, tinnitus and dizziness in 11, tinnitus, dizziness and stupor in 39 and stupor in 10 and 17. Cases 33 and 35 should not be admitted into this enumeration, as delirium is not known to have been absent from their history.

Dilatation of the pupil accompanied delirium in 20 and 38; but in 24 it was associated with drowsiness, inability to articulate, and other symptoms of the comatose condition, in connection with which it is mentioned in some of the *post-mortem* series, as in cases 18, 117, 297 and 299. Nevertheless there was no manifest obscuration of the mental faculties in case 34 of this series notwithstanding the great prostration of the patient and the dilatation of his pupils.*

Cerebral symptoms which did not culminate in delirium usually ceased with the decline of the primary fever, drowsiness becoming dissipated, the hearing less obtuse and the expression intelligent. Tinnitus aurium was in some instances no doubt caused by the administration of quinine.

The delirious condition lasted from one to many days; in case 28 there was an almost continuous delirium for three weeks. Usually it was manifested by quiet incoherent mutterings, although sometimes the patient became possessed with a desire to get up, and required constant watching but seldom restraint to keep him in bed. The soldier in case 41 was killed for want of this watchful care. In mild cases delirium was of short duration, subsiding with the other cerebral symptoms at the close of the primary fever. In protracted cases it oftentimes alternated with periods of stupor, from which the patient was aroused to incoherency with difficulty. The return of intelligence was frequently observed in the morning after a less troubled night than usual; on such occasions the patient's face was pale and shrunken, his eyes clear and bright. In other instances the delirium left headache with more or less of stupor and deafness for some time in its train, and in this event its recurrence was probable as an accompaniment of lung complication, aggravation of intestinal conditions, aural, parotid or other inflammations. But even when the intelligence was apparently unimpaired delirium was prone to return on the advent of these untoward complications. In fatal cases with strongly developed cerebral symptoms death occurred by coma and exhaustion; the patient becoming unconscious and greatly prostrated, the pulse almost imperceptible, the eyes glassy and half exposed, the lower jaw dropped, and the only visible movements those of respiration and muscular spasm. *Subsultus tendinum* was frequently associated with the delirious condition. Occasionally, in protracted cases, when delirium had given place to unconsciousness or coma vigil, the mind became clear for a short time during the extreme prostration which preceded death: 50 and 51 of the Seminary series are cases in point. In the *post-mortem* series death from coma is occasionally noted, as in 17, 18, 163, 171 and 235. Generally the cerebral symptoms of this series were similar to those observed in the Seminary hospital, but one or two anomalous cases may be noted: In 119 the restlessness which preceded the delirium persisted during its continuance in the aggravated form to which the term jactitation has been applied; in 25 there was extreme nervous agitation; in 160 the strangeness of the patient's manner led to the supposition that he was crazy;† and in 299 the symptoms were referred to congestion of the brain.

* Sir W. JENNER was the first to point out the dilated condition of the pupil in enteric fever as contrasted with the small pupil of typhus; of 23 fatal cases he observed dilatation in 7 and contraction in 2. MURCHISON—*Continued Fevers*, p. 541—says: "In fully three-fourths of my cases the pupils were abnormally dilated at some stage of the fever, and Dr. W. T. GAIRDNER has made similar observations at Edinburgh. Dilatation of the pupil may be observed after the tenth day in cases where there is no delirium or impairment of the mental faculties, or it may coexist with delirium, and especially with that condition approaching to hysteric coma already described."

† SKODA and OPPOLZER—*Le Mouvement Médical*, 1872, p. 154—say that it is not rare to find typhoid fever presenting only nervous phenomena and simulating a mental affection. In three cases in which MURCHISON was consulted the illness had at first been regarded as acute mania, and in two of these the removal of the patients to a lunatic asylum had been contemplated. He cites M. MOTET, *Archiv. Gén. de Méd.*, 1868, XI, p. 504, as having recorded a case of this kind in which the patient was actually sent to an asylum before the real nature of the malady was discovered,—p. 535.

At first sight it might be considered that the nervous symptoms of the Seminary cases did not differ in any respect from those generally recognized as characteristic of typhoid. Headache, restlessness, confusion of thought, giddiness, hebetude, somnolence, deafness, incoherence, muttering delirium and coma are daily under observation by the practicing physician. In the frequency of delirium, and the increased gravity which attached to its occurrence, the typhoid fever of our camps did not differ from that described by observers elsewhere.* Moreover the occasional exceptional or anomalous cases which have been mentioned are seen to have their parallels in the literature of the subject. But if the character of the delirium as it occurred among our troops be compared with that of typhoid delirium as usually described, it will be found that the former was generally less violent in its character than the latter. MURCHISON says delirium is at first often active and noisy, the patient screaming and shouting and being with difficulty kept in bed.† In JENNER's cases it varied much in character, being sometimes so violent that the patients left their beds and even ran screaming through the wards, while at other times it showed itself by slight delusions only discovered to exist by accident.‡ BARTLETT states that in many cases, particularly such as are rapid in their march and of great severity, delirium is attended with cries and screams, and that the constant presence of attendants with occasionally no slight degree of force is required to keep the patient in bed.§ Among thirty-eight fatal cases recorded by LOUIS, delirium was accompanied in twelve subjects, especially during the night, with violent agitation, necessitating the use of the straight-jacket; it was so considerable in one patient that the strongest means barely sufficed to keep him in bed on the tenth day, the day preceding death. The greater number of his patients, ten out of twelve, uttered cries so loud as to prevent their comrades in the same ward from sleeping.‖ Indeed, the straight-jacket figures as one of the essentials of treatment in the practice of this great authority.

Now, although watchfulness on the part of hospital attendants was often required to prevent a patient from attempting to rise under the influence of some incoherent fancy, restraint was seldom needful in the wards of our general hospitals during the war. The intense prostration which characterized the attack rendered force unnecessary, even when the patient developed a persistence in the attempt to carry out his delirious impulses. Usually he was docile as a child, requiring only a kindly hand to be laid on him to allay his fears or soothe his irritation. Certainly the violent agitation which was a characteristic of so many of the cases instanced by the authors cited formed no part of the general clin-

*The recorded experience of LOUIS shows delirium to have been present in 38 of 46 fatal cases; in 39 of 56 severe cases, and in none of 31 mild cases,—t. II, p. 150. JACKSON noted its existence in 108 of 303 cases, and of these 75 had a favorable and 33 a fatal issue; the fatality among the delirious cases being 30.6 per cent. as against 13.86 per cent. among the cases as a whole. He considered it probable, however, that slight delirium occurred at night in many cases in which it was unobserved and remained in consequence unnoted as a symptom,—p. 47. MURCHISON found 67 of 100 cases to present delirium or mental confusion, but in many of these the delirium was slight and occasional, occurring chiefly at night, while at other times the patient was quite rational; of the 67 cases 18 were fatal, but in only 22 cases, of which 11 were fatal, was there at any time complete unconsciousness,—p. 534. According to LIEBERMEISTER, among the typhoid patients treated in the hospital at Basle in the years 1865–68, there were 983 in whom the disease ran its course without any specially noteworthy brain symptoms; of these 34 died, or about 3.5 per cent. Slight delirium, excitement of low grade, lasting for only a short time or appearing only during the night, occurred in 191 cases, of which 38, or 19.9 per cent. died; well-marked delirium occurred in 176 cases, of which 96, or 54 per cent. died; stupor and coma were present in 53 cases, of which 30, or 70 per cent died.

†MURCHISON, p. 534.

‡"Ten of eighteen patients, *i. e.*, more than one-half, or in the proportion of 55.5 per cent. of those who were delirious after they entered the hospital, and of whom notes on the point were made, left their beds to wander about the ward."—JENNER, p. 22. Dr. REEVES also, p. 38, refers to the occurrence of violent delirium: "When the delirium is violent it usually requires constant restraint to keep the patient in bed. He cries, laughs and makes use sometimes of the most obscene language. At other times he seems in a fit of anger, and in some imaginary encounter strikes at the bed-posts, the wall or at the attendants with all his strength; his consciousness being embarrassed 'by false presentations, illusions, phantasms—a condition in which he is haunted by *spectra* analogous to those visual and auditory sensations which arise in connection with disease in the optic or acoustic nerve; a state in which the centre of consciousness, abnormally excited, forges subjectively all manner of images of incident and circumstance, with a self-assurance of their objective reality.'—*Simon's General Pathology*, p. 153. A very common impression with such patients is that they are absent from home and surrounded by persons who take particular delight in doing them an injury to both person and property; and harassed by these impressions, they leap out of bed and, if not at once arrested, make for the door, or in the attempt fall exhausted upon the floor."

§BARTLETT, p. 66. ‖LOUIS, t. II, p. 150.

ical history of the disease during the war. The patient was rarely noisy, but lay muttering in a low tone; when roused for the administration of food or medicine, he took without objection whatever was presented to him and sank back into his former condition. Active delirium was exceedingly rare, the only instance in the Seminary series being case 38, in which it was associated with dilated pupils and temporal headache.

THE DIGESTIVE SYSTEM.—***Anorexia*** was a constant symptom of the primary fever It was manifested from the occurrence of the chill of onset or accompanied the hebetude, headache and pains in the limbs which marked the departure from the state of health. ***Thirst*** was also common, but it did not attain its maximum until about the eruptive period in cases which ran a course unobscured by the intensity of the cerebral symptoms. ***Gastric irritability*** was rarely noted among the earlier manifestations of the disease; it occurred only in the two cases, 9 and 17, and had no manifest influence on their progress.* In case 25 it was noted at the acme, and in 39 nausea was associated with the intercurrence of pneumonia. When vomiting occurred at a later period it was ominous of dangerous inflammatory conditions in the abdominal cavity, although in the only case, 24, in which it was noted as having affected the patient late in the history of the attack, it did not possess this sinister meaning. In cases 19, 32 and 226 of the *post-mortem* records vomiting was associated with perforation of the intestine, and in 243 with gangrenous conditions in the abdominal cavity. It was also noted at a late period in 165 and 166; in 280 it occurred earlier, but persisted to the end. Nausea in 150 was an accompaniment of the onset of peritonitis.

In only three of the Seminary cases, 15, 32 and 50, was the breath mentioned as having been offensive during the progress of the fever.

The *tongue* was at first moist, coated at the base with a white, gray or yellow fur, and with the margins and tip of an unnaturally red color. Gradually the base and centre lost their moisture and became brown in color and rough, the edges continuing as before. Sordes gathered on the teeth, lips and tongue, and were generally regarded as an exponent of the typhoid condition, in view of the great prostration, muttering delirium and semi-unconsciousness which were usually present with these accumulations. The dry, brown tongue became cracked, and blood which oozed from its fissures added to the mass of sordes. The patient when roused for the moment seldom expressed a desire for food or drink, but swallowed, although sometimes with difficulty, whatever was placed in his mouth. Later in the attack the tongue lost its dark fur, becoming red and glossy and afterwards moist, or it cleaned gradually, leaving brown or yellowish patches at the base or on each side of the mesial line far into the period of convalescence.† When cerebral symptoms were not strongly developed the patient sometimes showed a desire for food notwithstanding the dry,

*JACKSON, in his analysis of 303 cases, found nausea and vomiting to be frequent symptoms, particularly at the commencement of the fever,—p. 38. Dr. FLINT, on the contrary, considered that during the febrile career nausea and vomiting are not only absent in the majority of cases, but are unimportant as symptoms, occurring at irregular periods, seldom recurring or persisting and possessing no special significance,—p. 172. WOOD states that the stomach though often retentive is sometimes irritable.—Vol. I, p. 316. LOUIS found that in thirty fatal cases twenty had nausea, vomiting or pains in the epigastrium. Each of these symptoms regarded by itself he conceived to be of little value as an indication of the condition of the stomach, but his necropsical observations demonstrated that the mucous membrane of the stomach was more or less altered in all the cases (five) in which epigastric pain was associated with vomiting of bile,—t. II, p. 45. MURCHISON was inclined to regard vomiting at the commencement of the attack as a favorable symptom, but cites PEACOCK, *Lancet*, 1865, Vol. I, p. 117, as expressing an opposite opinion. WILSON says that nausea and vomiting occur in the early stages of a small proportion of the cases, and that so far as his own observation goes, early vomiting has been followed by the severest forms of the disease,—p. 171. All authorities agree as to the generally deadly signification of vomiting in the later stages when associated with other symptoms indicative of peritonitis or perforation.

† In JACKSON'S cases the tongue was characterized as dry, dark or denuded,—p. 37. BARTLETT says that in a certain proportion of cases, severe as well as mild, it is but slightly altered in appearance; even in fatal cases, terminating early, it may be merely somewhat dry and coated. In mild cases it is often almost natural in appearance or covered only with a light yellowish coat, while in others of a similar grade of severity it is smooth, moderately red and moist with a tenacious adhesive matter which is common in the severe forms as well as in the mild. In grave or protracted cases it gradually becomes dry and brown along its middle and red at its tip and edges; later it becomes dark over its whole surface,—sometimes nearly black,—glazed, stiff and crossed by cracks and fissures. The dry crust peels off in flakes and patches, leaving the surface red and shining; sometimes there is a whitish aphthous exudation on the mucous coating of the tongue and mouth; at other times, late in the disease, the tongue is morbidly red, sometimes swollen, painful and tender and occasionally ulcerated,—p. 72. According to WOOD, the tongue, from being moist and clammy, often becomes quite dry, assumes a brown color and is at times gashed and sore. He regards its condition in the later stages as an element of prognosis: A favorable termination is indicated by the tongue becoming moist and clean; but in other instances, especially in severe and protracted cases, "instead of cleaning gradually from the edges it throws off its fur in flakes, generally at first from the centre or towards the base, leaving the surface smooth, red and somewhat shining, as if the papillary structure had been partially destroyed. This state of the tongue is sometimes preceded by soreness of the fauces; and the velum pendulum and half arches will, if examined, be found covered with an exudation which they are beginning to part with. This is usually a sign of an approaching amelioration of the symptoms. If the tongue when thus cleaned remain moist, convalescence may be pretty confidently expected, though it is always tedious. In some instances the tongue coats itself over again, and again becomes clean; and this change may take place more than once. Occasionally, too, an aphthous exudation appears upon the surface; but still, if the moisture continue, the prognosis is ultimately favorable. If, however, at any time during the above cleaning process, or even after it has been completed, the tongue should become permanently dry the symptoms are again aggravated and the patient again thrown into danger."—Vol. I, p. 317.

brown and fissured condition of the tongue: In case 43 of the Seminary series the appetite was good although the teeth were covered with sordes; and in 48 it is said to have been retained until the day of death.

In forty-eight of the Seminary cases in which the condition of the ***Tongue*** was recorded during the progress of the fever, it was red at the tip and edges and variously coated brown, gray, yellow or white on the dorsum in thirty-two cases. Indeed it may be said that these characteristics were present in thirty-four cases, if the description given in case 3, "smooth, fissured, red, dry, quite clean anteriorly, but with a brown fur posteriorly," and that in 22, "red and slightly coated yellowish-white," be accepted as equivalent to *red at the tip and edges.** Of the remaining cases the tongue was dry, brown and fissured in 10, 19 and 24; red, dry and glossy in 6, 7 and 16; smooth, glossy and dry in 46; brown in 14 and 50; moist and coated in 17 and 41; dry and coated in 39; dry, red and with enlarged papillæ in 5; and yellowish-white when first noted, and afterwards white in 2.

In two cases, 4 and 18 of the thirty-four in which what may be called the characteristic tongue of typhoid was present, it is mentioned as having been at one period flabby. In the first of these the early appearance of moisture on the skin, and the benefit following the administration of quinine, suggest the possibility of a malarial complication; but in the other the flabbiness of the tongue was unaccompanied by other suggestive symptoms.

The tongue when protruded in the earlier stages of the disease was often tremulous, participating in the debility which affected the muscular system. In the later stages it was protruded with difficulty, and the mouth was frequently coated with a tenacious glutinous mucus.

Sordes gathered on the teeth and lips of twenty-one of the fifty-one cases, and five of these had a fatal termination. Five of the thirty cases which did not present these accumulations were likewise fatal: 41, killed in his delirium; 42, died of pulmonary congestion; 47, from a recrudescence of the diarrhœal affection; 51, from exhaustion, and 46, from some unstated conditions several months after the primary attack.

From these facts it may be inferred that although sordes and the generally accompanying dry, dark tongue were symptoms of great gravity, the disease was nearly as prone to end fatally in their absence as in their presence.

The condition of the mouth and tongue was alone sufficient to account, in many cases, for the dysphagia or disinclination to swallow which was sometimes manifested; but owing to the difficulty of examining the throat in patients laboring under typhoid prostration, it is probable that inflammation and ulceration of the fauces and pharynx were more frequently present than appears from the records.† Dysphagia in case 40 was due to pharyngeal inflammation; but in other instances, as in 197 of the *post-mortem* cases, it must be attributed mainly to the deep stupor in which the patient was plunged.

Diarrhœa was present at some period in the progress of most of the cases, varying from a slight relaxation of the bowels to an attack giving six, eight or more stools daily. Occasionally the intestinal affection was manifested by a want of consistence of the passages rather than by their frequency. The discharges were usually thin, small and yellowish, sometimes watery, often fetid, and generally painless.‡

* The recognition of this condition of the tongue as characteristic of typhoid fever has the authority of Sir W. JENNER, who says that: "The small dry tongue with red tip and edges, smooth, pale brownish-yellow fur, and fissured—the surface seen between the fissures being of a deep red—may be considered differentially as a diagnostic sign of typhoid fever."—*Monthly Journal of Med. Science*, Edinb., Vol. X, 1850, p. 310. "I have observed, indeed have learned to regard it as almost characteristic, that the tongue in typhoid fever shows at the tip a wedge of reddish or brownish surface free from coat."—J. M. DA COSTA in *Trans. College Physicians*, Phila., 1877, p. 104.

† JACKSON found a difficulty in deglutition more or less strongly marked in 21 of his 303 cases, and of these four were fatal. He considered that were he to count only those cases in which the dysphagia was very great this symptom would be an indication of much danger,—p. 38. Of thirty-two grave but not fatal cases in which LOUIS examined the mouth and fauces with care, there was inflammatory redness in twenty-one; the tonsils were swollen in three of these cases, the velum in two, the pharynx to some extent in one; the roof of the palate was in one instance covered with a number of whitish pellicles which were easily separated from it; ulceration was present in three cases, the pillars of the fauces being affected in two and the lower lip in the third,—t. II, p. 90. And in connection with these signs of inflammation most of the patients complained of pain, pricking sensations, dryness and more or less difficulty in swallowing. But among his fatal cases there were several in which the pharynx and œsophagus were more or less seriously affected with no symptom to indicate their altered condition. In explaining this anomaly by the presence of delirium, he took occasion to remark that an obstinate refusal to drink on the part of a delirious patient may be regarded as an index of the state of the throat and generally of the organs of deglutition,—t. II, p. 130.

‡ "The stools may be only one or two daily, or more frequent, up to ten, twelve, or more. They are generally yellowish or brownish, and apparently healthy except in consistence. This is one of the remarkable features of the disease. While in other severe fevers the discharges are almost always greatly altered, in this they often remain nearly natural, with the exception alluded to, throughout the complaint."—WOOD, Vol. I, p. 319. BARTLETT compares the liquid, turbid and yellowish stools to new cider; but says that in a considerable number of cases they are of a dark-brown color, fetid and offensive,—p. 75. MURCHISON represents the stools as liquid and of the color of yellow ochre, offensive and often ammoniacal in odor and alkaline in reaction,—p. 524. WATSON characterizes them as somewhat like pea-soup,—p. 1097. LIEBERMEISTER says: "The stools are thick or watery, light-brown or yellow, often like pea-soup; after standing they separate into two layers; the upper is a turbid brownish fluid, the lower is a brownish flocculent mass; the reaction of the fluid is alkaline; it contains little albumen. In the sediment we find fragments of food, detritus, mucous corpuscles, fungous spores, accidental substances, often crystals of triple phosphate,"—p. 92.

Omitting cases 33 and 35, there are forty-nine cases in the Seminary records in which the condition of the bowels was stated from day to day. In forty-five of these the diarrhœal tendency was more or less marked; nevertheless in nine of them at some period of their history it was deemed advisable by the medical attendants to adopt some means to effect a movement of the bowels: In two, 36 and 46, enemata of soapsuds were employed with the intent of relieving abdominal pain and distention associated with constipation in the one case and a quiescent condition of the bowels in the other; in the former no recorded effect was produced, and diarrhœa did not occur until several days later; in the latter the enema appeared to determine a condition of relaxation. In 30 and 40 castor oil was administered without producing any over-active effect; but in 6 its exhibition was followed by umbilical pain and a necessity for the administration of acetate of lead and opium. In 38 and 39 calomel and jalap were employed without apparent harm to the intestinal tract. In 9 and 13 blue-pill and Epsom salt were administered, but the induced action did not persist. Of the four cases which were not characterized by marked diarrhœal tendencies the bowels are said to have been regular in one, the mild febrile attack, 2, in which castor oil was given towards the conclusion of the case; in two cases, 8 and 15, the bowels were quiet and calomel and jalap did not cause undue action; in the fourth of these cases, 29, there was notable constipation, no passage having been procured during the stay of the patient in hospital except by the use of castor oil.

It is somewhat difficult to compare the relative frequency of diarrhœa in typhoid cases reported by different observers when numerical statements only are made the basis of the comparison. This appears due to a bias given to the clinical records by the pathological knowledge of the reporter. The recognition of an intestinal lesion as the anatomical essential of the disease and the connection of diarrhœa with an ulcerated condition of the intestinal mucous membrane have probably led many physicians to regard and report as diarrhœa in typhoid fever that which would not have been recognized by so formidable a title had it occurred in the course of a pneumonia or other acute disease. Laxness of the bowels, or even a tendency to relaxation, manifested by a diminished consistence of passages of natural frequency, may by some have been considered as establishing the diarrhœal condition. To draw conclusions from statements regarding the frequency of diarrhœa it is needful to know precisely to what conditions of the bowels the term was applied. It is clear that Louis recognized one passage daily as a typhoid diarrhœa; he graded this symptom as *fort*, *modéré* and *faible*, and the last included cases that might not by every one be considered diarrhœal.*

Nevertheless, in view of the acknowledged absence of diarrhœa in a notable proportion of typhoid cases observed in civil practice, there appears no room to doubt that the cases which occurred among our soldiers during the war, as illustrated by those preserved in the records of the Seminary hospital, were characterized as a whole by the prevalence of a more severe and protracted diarrhœa than is usually associated with the disease.†

*Louis's statistics bearing on the frequency and severity of diarrhœa in typhoid fever are as follows: Of 120 cases diarrhœa was present in all but two. Of 32 fatal cases an active diarrhœa of eight to ten or more stools in the twenty-four hours was present in 18; a moderate diarrhœa of from four to six stools daily in 7; and a mild diarrhœa of one or two stools daily, rarely more, also in 7. In 57 severe but not fatal cases the diarrhœa was violent in 14 patients who had from eight to twenty stools daily; less severe in 22 cases with two to four stools daily; and moderate in 21 others in which the number of the stools is not indicated. The diarrhœa in 31 mild cases was less intense and of shorter duration than in those already stated; it was considerable in 4 cases, absent in 2, while in the remaining 25 the degree of severity is not stated in direct terms, but the presumption is that it did not exceed one or two stools daily,—t. II, pp. 17, 23 and 25. Hale, in his analysis of the cases of the Massachusetts General hospital, concluded—p. 223—that the principal difference between the typhoid fever of New England and that of Paris, as delineated by Louis, was the greater frequency of diarrhœa in the latter. In his hospital cases he found diarrhœa in 167 of 297 cases, or in 56 per cent.; and in 197 cases of which he had the histories in detail the proportion was still less, 96 cases or 49 per cent. But he found a similar difference in regard to the prevalence of diarrhœa in other acute diseases according as they were recorded in Massachusetts or Paris; Louis reported 61 cases of diarrhœa in 273 of acute disease other than typhoid fever, which is nearly 30 per cent., while in 159 cases of similar disease in New England, diarrhœa was present in only 18 cases, or 11 per cent. From these facts he concluded that the more frequent occurrence of diarrhœa in the fever of Paris was not to be attributed to any peculiarity in the characteristics of the disease itself as compared with the typhoid of New England, but to some more general cause affecting other acute diseases in an equal proportion. It is possible that the more general cause may have been, to some extent at least, a want of precision in the application of the term diarrhœa.

†Murchison considers diarrhœa to be absent in fully one-fifth of the cases,—p. 524. See also the preceding note giving the observations of Louis and Hale. In Flint's *Clinical Reports on Continued Fever* he states that diarrhœa more or less in degree or duration was present in 12 of 13 cases of typhoid fever, in 7 of which it was mild or slight, in 1 severe and in 4 subsequent to the operation of cathartics,—p. 80; in 9 of 18 cases and in 14 of 29 cases,—p. 173; and in 13 of 14 cases, in all of which it was mild and easily restrained by opiates,—p. 316. With few exceptions, probably not more than three or four, no cathartic or laxative medicine was administered in the cases analyzed by Dr. Flint, consequently the condition of the bowels as respects frequency of the dejections and other symptoms were such as belong to the disease uninfluenced by medical interference. The facts contained in the histories of some of his cases he considers to be of interest and importance, and believes that they will be a surprise to some of his readers as showing that oftentimes instead of diarrhœa a state of absolute constipation was present. He gives several cases in illustration, of which the following is quoted as a specimen: "*Case* 3. In this case the bowels had not moved for *three* days prior to admission. They remained quiescent for *two* days after admission

In general terms, the gravity of the affection was proportioned to the severity of the diarrhœa.* In mild cases the diarrhœal attack was slight; in severe cases it was aggravated, and death in many instances was precipitated by its violence. The frequent occurrence of involuntary passages shows that an implication of the cerebral system did not interfere with this manifestation of the morbid condition of the intestinal tract. But there were many exceptional cases in which, with moderate diarrhœa, perforation of the intestinal tunics took place and death resulted from the escape of fæcal matters into the peritoneal cavity. The subject of perforation will be submitted to better advantage in connection with the *post-mortem* records. Cases also proved fatal from the gravity of pulmonary lesions without being of necessity associated with an aggravated diarrhœa.

Hemorrhage from the bowels occasionally added to the exhaustion consequent on the diarrhœa and prostration due to the specific action of the fever-poison. In case 28 of the Seminary series the bleeding was profuse, and occurred about the end of the third week, no doubt from an invasion of the vascular walls by the ulcerative process; the case terminated favorably. It is probable that bleeding in small quantity, dependent on a congested state of the intestinal mucous membrane, occurred in some instances at an early date without exercising any marked influence on the progress of the disease; but it is certain that the profuse hemorrhages of a later period were symptomatic of grave, immediate and possible dangers. Occasionally severe hemorrhage occurred in cases which were otherwise free from alarming symptoms; of this Brigade Surgeon GEORGE H. LYMAN has furnished an instance.† Fatal exhaustion sometimes followed the loss of blood, as in case 27 of the *post-mortem* records. But if the patient rallied from the loss, the possibility of a fatal recurrence or of peritonitis with or without perforation, as suggested by the depth of tissue necessarily involved in the ulcerative process before a hemorrhage of this character could take place, was such as to occasion the most serious forebodings.‡ It is probable also that fatal exhaustion was sometimes the result of hemorrhage which did not manifest its existence by the

and moved spontaneously on the *third* day, *i. e.*, on the *sixth* day after the last preceding movement. On the day following another dejection occurred, which was moulded and perfectly natural in appearance—a phenomenon which is not likely to fall under the observation of practitioners who are accustomed to administer cathartics daily, or every other day, during the progress of the disease!"—p. 175.

* MURCHISON is very positive on this point. He says, p. 524: "Twelve years ago I found that in 34 cases, where the diarrhœa from its severity or duration was noted as excessive, 10 died; but that only 10 died out of 59 cases in which the diarrhœa was moderate or slight. Since then I have had under my care more than two thousand cases of enteric fever, and no fact appears to me to be better established than that the severity and danger of this disease are in direct proportion to the intensity of the diarrhœa." NATHAN SMITH in 1824, writing of the fever as it prevailed in New England, expressed a similar opinion: "The danger of the disease is in proportion to the violence of the diarrhœa; when the patient has not more than four or five liquid stools in the twenty-four hours it is not alarming, as it does not seem to weaken him much, but if they exceed that number serious consequences may be apprehended,"—p. 37.

† See his letter to the *Boston Med. and Surg. Journal*, Vol. LXV, 1862, p. 389: "One case of continued fever so mild in its type as to call for little or no treatment was complicated with intestinal hemorrhage to an alarming degree."

‡ Hemorrhage from the bowels occurred in 31 of JACKSON's 303 cases, and of these 20 terminated favorably while 11 died. "In some instances the hemorrhage was followed by relief, and in a few by well marked and permanent relief. But in most there was great weakness and sense of exhaustion in consequence of it,"—p. 39. Notwithstanding his statement as to the relief occasionally obtained, this author's observations show distinctly the increased danger in cases attended with hemorrhage, for while the general death-rate based on his 303 observations was 13.86 per cent., the rate among the hemorrhagic cases was 35.5 per cent. Hemorrhage amounting to over six ounces occurred in 58 of 1,564 cases under MURCHISON's care, or in 3.77 per cent. In 18 of 60 hemorrhagic cases the antecedent symptoms were mild, and in 8, of which 6 were fatal, the bowels up to the occurrence of the hemorrhage had been constipated. Of the 60 cases the bleeding commenced towards the close of the second week in 8; during the third week in 28; during the fourth in 17; during the fifth in 1; during the sixth in 3; during the seventh in 1, and during the eighth in 1, while in 1 case the date of its occurrence was not recorded. In three cases where it took place on the sixteenth, eighteenth and nineteenth days, it recurred on the forty-ninth, thirty-second and forty-fourth days. This author never observed benefit from its occurrence, but on the contrary has frequently seen patients die unexpectedly by syncope a few hours after a copious bleeding. He therefore agrees with BRETONNEAU, CHOMEL, LOUIS, JENNER, BELL and others in regarding it as a dangerous symptom, although he cites some authors who taught otherwise: GRAVES, in his *Clinical Lectures*, Dublin, 1848, Vol. I, p. 266, as speaking of certain cases in which the occurrence of hemorrhage was thought to be productive of marked benefit; KENNEDY, *Edinburgh Med. Jour.*, 1860, p. 226, as of a similar opinion, and TROUSSEAU, *Clinique Médicale*, Paris, 1865, t. I, p. 225, as urging that it is a less dangerous symptom than is generally thought, inasmuch as in seven years he had known only three cases to prove fatal,—pp. 525–29. LIEBERMEISTER, although failing to concur with GRAVES and TROUSSEAU as to the favorable import of hemorrhage from the bowels in this fever, does not on the other hand regard it as having so dangerous a significance as was formerly thought. His mortality statistics agree with those of JACKSON given above: 38.6 per cent. of his hemorrhagic cases died, while the general rate was only 11.0 per cent. Nevertheless he points out that a patient seldom dies as the direct result of hemorrhage or during the collapse that immediately follows it, and he considers the statistics inconclusive, since bleeding occurs most frequently among the gravest cases in which the mortality without hemorrhage would still be highest. He concludes, therefore, that "while intestinal hemorrhage must be regarded on the whole as affecting the prognosis unfavorably, yet each individual case must be judged on its own merits,"—p. 149.

presence of blood in the stools.* Although no clinical history is recorded in case 176 of the *post-mortem* series, the possibility of the occurrence of death without external manifestations of erosion of the intestinal vessels, other than those involved in the supervention of sudden collapse,† is strongly suggested by the condition of the colon, which was found filled with blood for eighteen inches of its length.

Diarrhœa occurring during the course of the primary fever was associated with heat and dryness of skin, and in mild cases its subsidence was concomitant with the decline of the pyrexia. Moreover, when it persisted at a later period along with a persistence of the febrile action in more dangerous cases, its abatement or absolute cessation was often coincident with the appearance of moisture on the skin and especially of free perspirations. Thus in eleven of the Seminary cases a moist condition of the skin was followed by more or less quiescence of the bowels, and in one, 49, the recurrence of acute diarrhœa was associated with suppressed perspirations and increased heat of skin. On the other hand, in five instances, 16, 27, 34, 46 and 47, looseness of the bowels persisted notwithstanding the occurrence of perspirations: in two, 14 and 37, it followed their appearance, and in one, 26, it abated with diminution of the febrile heat some days before the skin became moist.‡

Although diarrhœal stools were usually passed without pain, the patient generally suffered from pain or tenderness in the abdomen at some period of the disease. In many instances the tenderness was limited to the situation of the ileo-colic junction, and although in others the suffering was not thus localized, it was nevertheless more acutely felt in that region than in other parts of the abdominal cavity. It was frequently associated with tympanitic distention and gurgling on pressure.§ These symptoms usually accompanied the diarrhœa, sometimes preceded it, and often persisted after its subsidence.

Tenderness **was present in thirty-nine of the forty-nine Seminary cases,** ***tympanites*** **in twenty eight and** ***gurgling*** **in nineteen.**

Tenderness was recorded as having affected the abdomen generally in eighteen of the thirty-nine cases, but in ten of these certain regions were, in addition, specifically indicated as the seat of suffering: in *three* the right iliac region was particularized, in *two* the right iliac and umbilical and in *five* both iliac regions,—one of these having the umbilical and another the hypogastric region also affected. The right iliac region was mentioned alone as the site of tenderness in fifteen cases, and in association with other regions, in addition to the cases just mentioned in connection with general abdominal tenderness, three times—with the umbilical once, the left iliac once and the hypogastric and umbilical regions once. The last-mentioned region was principally affected in one case, 6, in which the tenderness was probably due to castor oil administered; pain in the epigastrium was reported in one case, 17, in which the onset of the disease was characterized by the presence of nausea; lastly, in one case, 48, tenderness was associated at different times with different regions, as the left iliac, epigastric and umbilical, the track of the colon, and on one occasion the right side.

In these thirty-nine cases of abdominal tenderness the general surface is mentioned eighteen times, the right iliac region twenty-eight times, the left iliac seven times, the umbilical seven times, the epigastric three times and the hypogastric once.

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* Murchison has observed [illegible] and the patient died in [illegible] had been visited.—p. 526.

† "In my cases of intestinal hemorrhage the temperature suddenly falls sometimes below the normal standard, but it speedily regains its former height or exceeds it."—Murchison, p. 526. "If severe hemorrhages supervene in the course of abdominal typhus, particularly hemorrhages from the bowels, a considerable fall of temperature may be met with, even to below normal; but the temperature usually rises again speedily to the previous heights, or even above them."—C. A. Wunderlich, *On the Temperature in Diseases*, New Sydenham Society, London, 1869, p. 313.

‡ See notes to p. 289 and 294, supra, [illegible] diarrhœa, [illegible] the attack. [illegible] fever is, the disease as described by the [illegible] cities than in the cases depicted by our medical officers during the war, and the opinion that such perspirations have no favorable influence on the progress of the disease. Speaking definitely as to a possible relationship between perspiration and diarrhœa Louis says, t. II, p. 266, that in grave cases [illegible] was nearly always severe with [illegible] shown that [illegible] diarrhœa [illegible] perspirations lasted for eighteen days.

§ Gurgling on [illegible] in the lower part of the abdomen and especially in the right iliac region, was regarded by Chomel as of [illegible] importance. In his experience it was as rare in other diseases as it was common in typhoid fever,—t. I, p. 12. Bartlett considered it a [illegible]—p. 78. Reeves found it a constant accompaniment of enteric fever,—p. 20. Murchison noted it in 31 of 44 cases, but subsequent experience satisfied him that it is absent in a larger proportion of cases than is indicated by these figures,—p. 523. Wilson considers that this symptom, when associated with tenderness, has an undoubted diagnostic value, but as it occurs so constantly in other affections attended with diarrhœa it cannot be looked upon as [illegible] —p. 174.

Tenderness, although usually not a source of much complaint, was sometimes very acute; in 10 it was recorded as exquisite, and in 30 the patient objected to having the abdomen touched.

In three of the four cases which were free from diarrhœal tendencies there was nevertheless some tenderness of the abdomen. Among these is included case 29, in which the bowels were moved by the action of castor oil; the only case which presented no clinical sign of an enteric lesion was the mild and apparently unspecific attack recorded as case 2.

Of the ten cases in which there is no record of abdominal tenderness, *four*, 2, 4, 12 and 14, were of a mild type. In *one*, 34, which was more severe, the presence of tympanites on the record suggests that the absence of tenderness may have been due to an omission on the part of the recorder. A similar remark is applicable to the *three* fatal cases, 44, 45 and 51. In *one* case, 39, the gravity of the affection was dependent on chest complications, and in *one*, 41, the record was cut short by the accidental death of the patient.

Distention of the abdomen was usually present in severe cases and absent in those of a mild type.* Generally it was associated with diarrhœa and abdominal tenderness. It was, however, sometimes present in the absence of decided diarrhœa, as in 46, in which an enema was given for its relief. In four cases specified in the last paragraph tympanites appears on the records, while tenderness is not mentioned; but in some of the cases it is stated that although the abdomen was tympanitic there was no tenderness: In case 12 it does not appear that the abdomen was at any time tender, and at one period in the history of 26 there was much tympanites, but no tenderness until some time later when the right iliac region became acutely affected. On the other hand, in 10, with much tenderness the abdomen was reported as scaphoid, a term ambiguous in this connection, but probably used to indicate a concavity of the surface: but in 48 there is no uncertainty as to the condition.—the abdomen became flat shortly before death.

The frequency with which tympanites was present in fatal cases may be seen by a reference to the *post-mortem* records. In case 19 of this series, the only instance in which meteorism is stated as *not* present, hardness and tenderness of the abdomen were associated with symptoms of intestinal perforation. Pain and tenderness in cases fatal by peritonitis, with or without perforation, were usually extreme, but not always confined to the anterior aspect of the abdomen; in 249, the pain, which was so exquisite as to occasion loud outcries, was referred to the back.

In connection with the symptoms referable to the abdomen it may be mentioned that in no case do the clinical records refer to enlargement of the spleen as a characteristic of this fever. That it existed is certain; necroscopic observations leave no doubt of the fact, but the attention of our medical officers does not appear to have been given to its detection during life.†

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*Hale recognized meteorism in 130 of 197 cases; in 43 it was not present, and in 24 his records did not show whether it was present or absent,—p. 190. Murchison found the distention greatest in the gravest cases; it was present in 20 of 21 fatal cases; of 17 in which it was extreme, death occurred in 7, while of 62 in which it was moderate or slight only 14 died, and of 21 in which it was absent none died,—p. 522. Jenner pointed out that the "convexity is from side to side and not from above downward. The patient is never pot-bellied but tub-shaped, the cause probably being that the flatus occupies the colon, ascending, descending and transverse."—*Monthly Jour. Med. Science*, Edinburgh, Vol. IX, 1849, p. 820.

†Since Louis first called attention to enlargement of the spleen in cases characterized by tumefaction and ulceration of the patches of Peyer this condition of the organ has assumed an increased importance in the opinion of the profession, being generally regarded as one of the most constant and characteristic symptoms of typhoid fever. Jackson in 1838 wrote that: "Enlargement of the spleen was discovered in various cases; some before we were aware of M. Louis's observations on this point, and many more after. But it was not a matter so carefully attended to, in every case, as to give value to our observations,"—p. 57. The tumefied spleen was felt during life in 19 of Enoch Hale's cases, not felt in 21 and not noted on the record in 157 cases. He says: "Enlargement of the spleen, as perceptible during life, is not of much value as a pathognomonic sign. This organ is occasionally felt below the ribs, or by pressing the fingers under the cartilages during a full inspiration; but in many cases it cannot be perceived even where examination after death shows it to be much enlarged. A careful percussion would aid in discovering it. But since there is much uncertainty in regard to the enlargement itself, as a constant occurrence, and some difficulty in ascertaining it when it does occur, we can attach very little importance to it in diagnosis,"—p. 190. But although these observers thus long ago called attention to the enlarged spleen as a symptom and aid to diagnosis in typhoid cases, the changes in the organ were mentioned by Bartlett, Wood and Dickson only as of *post-mortem* interest, and to this is probably due the failure of our medical officers during the war to note splenic enlargement in their clinical records. Murchison says the spleen is often much enlarged and can be felt through the abdominal wall,—p. 523; and Liebermeister, that the enlargement begins early, and can usually be demonstrated after the middle of the first week, increasing in the second week, diminishing in the fourth week, and at the height of the disease reaching to double or treble its normal size,—p. 104. Christian Bäumler—*Can the Mildest Forms of Enteric fever be distinguished from acute Febrile but non-specific Gastro-enteric Catarrh?*—*Dublin Journal Med. Sciences*, Vol. 70, 1880, p. 384—answers his query in the affirmative by the statement that a decided enlargement of the spleen existing from the beginning of the attack clearly points to the infectious nature of a given disease. His experience leads him to doubt the existence of a "gastric fever," *i. e.*, a catarrh of the mucous membrane of the stomach, or perhaps also of the small intestine, accompanied by pyrexia of a week's duration or

CHEST SYMPTOMS are mentioned in thirty-one of the fifty-one Seminary cases.* Bronchial cough was frequently an early symptom of the attack; sometimes dry, at other times attended with frothy expectoration, it usually continued to the end of the fever, and in occasional instances, as in 35, persisted for some time longer. But in many cases it was not developed until towards the end of the primary fever.

In about two-thirds of the thirty-one cases the cough was slight and did not add much to the sufferings of the patient. In twelve cases the chest symptoms were severe: In 5 and 11 there was marked bronchitis; in 28 cough, which was present from the beginning, became associated at a later period with sibilant râles and hurried respiration; in 39 it was troublesome from the first, and prevented sleep at a later stage; in 45 also sleep was prevented, and the lung complication certainly caused death; in 36 and 46 there was consolidation of the lower lobes of the lungs and bronchitic sounds in the upper lobes; in 42 death occurred from pulmonary congestion; in 50 pleuritic signs and hurried respiration were noted, and in 51 pain in the chest and increased frequency of the respiratory movements; in 38 the cough was slight at first, but the patient from the twenty-fifth to the thirty-second day labored under a pneumonitic attack, manifested by pain in the chest, hurried respiration and rusty sputa, and associated with a recurrence of febrile delirium; lastly, in 40, one of the few cases in which the chest symptoms were of a serious character during the early stages of the disease, an attack of pneumonia preceded the typhoid onset.

It is to be observed, however, with regard to the occurrence of blood-streaked sputa, that this in some instances was not a symptom of an engorged or eroded condition of the pulmonary membrane or tissues, but was considered an accidental result of a trivial epistaxis.†

Bronchial cough was sometimes associated with hoarseness, indicating the participation of the laryngeal mucous membrane in the inflammatory processes. *Post-mortem* observations showed in so many instances the presence of ulceration of this membrane that inflammatory redness in the fauces during life must be regarded as strongly suggestive of the existence of more extensive and dangerous lesions.‡ The voice generally became low-toned or whispering, symptomatic of general prostration, and in the later stages of fatal cases the power of articulation became lost.

In a large number of such of the *post-mortem* records as enumerate more or less of the symptoms, cough is found to have been present with accelerated or difficult respiration and pain in the chest. Generally this affection of the respiration was due to congestive or pneumonitic processes, although in many cases the breathing was hurried during the first stages of the disease as a result of the general febrile condition; but the clinical records do not set forth with sufficient precision the condition of the lungs in these cases. The fatality of this fever among our troops as compared with that of the same disease in the experience of civil practitioners, together with, as will be seen hereafter,§ the great frequency of lung complications in the fatal cases, gives definite testimony as to the greater frequency and severity of such complications among the typhoid cases of the war.

OTHER CLINICAL FEATURES.—***Micturition*** was frequently involuntary. Sometimes the urine was passed with difficulty, as in 12, 28 and 35; in the first of these dysuria during the fourth week was accompanied with pain and the passage of blood from the bladder, and in the second the use of the catheter was required to alleviate hypogastric distress. But pain and swelling in the hypogastrium were not always indicative of retention of urine, as may be seen in case 244 of the *post-mortem* records, in which an abdominal abscess was the cause of these symptoms. It may be observed, however, that this case is not recognizable from the record as one of typhoid fever.

The urine was scanty and high-colored during the primary fever, but its characters at a later date were seldom specified. In the Seminary case, 28, the liquid removed had a strongly alkaline reaction and contained blood,

more and by general febrile symptoms. He must therefore have met with few cases in which percussion failed to outline an enlarged spleen. Nevertheless, LIEBERMEISTER observes that enlargement is sometimes absent, especially in old persons, in whom the anomaly is explained by a thickening of the capsule or stroma of the organ, or by the possession of a spleen smaller than the normal before the commencement of the disease; and he cites HOFFMANN as having stated that the essential changes can be, and usually are, present, although the spleen is not strikingly enlarged.

* In LOUIS's experience cough was present in 50 of 57 subjects who had severe attacks of the fever, but it was generally so slight and infrequent, that its existence would not have been recorded had he made note only of that which came under his personal observation; and it was but little less frequent in the cases which were mildly affected,—t. II, p. 283.

† LOUIS indicates blood-tinged sputa as due occasionally to epistaxis,—t. II, p. 283. FLINT also notes—p. 199—that "in three cases sputa expectorated were observed to be streaked with blood, which may have been derived from the posterior nares, but this is not certain."

‡ W. W. KEEN—*On the Surgical complications and sequels of the Continued Fevers*, Washington, Smithsonian Institution, 1877—regards hoarseness and sometimes complete aphonia, followed by paroxysms of dyspnœa, especially at night, as the symptoms of laryngeal implication. But even the first paroxysm may be sudden, unexpected and fatal, particularly in supra-glottic œdema. He shows laryngeal disease to be a cause of dysphagia, which is present in cricoid and arytenoid necroses; for in sixteen such cases the pharynx was normal in ten and inflamed in only six cases,—pp. 25, 26.

§ See *infra*, p. 430.

mucus, pus, epithelial scales and excess of phosphates: in 50 it was acid and albuminous, and in 38 albuminous during the later stages, when pneumonia was present, but normal chemically and microscopically earlier in the attack.*

Diminished secretion of urine, so frequently reported in the early period of the disease, was often followed by delirium or stupor, but it does not appear that any causal relationship existed between these phenomena; the urine was scanty in many cases that were not characterized by prominent head symptoms.

The *parotid glands* became affected in two of the Seminary cases, 44 and 50, and in several of those detailed in the *post-mortem* records.†

The inflammatory action was rapid in its progress to suppuration and disintegration of the glands. As this complication is not mentioned in any of the recoveries its presence must be regarded as significant of extreme gravity; moreover, as it is generally accounted a rare complication of typhoid fever, the frequency of its appearance among our cases during the war must be received as distinguishing them from the typhoid of civil life.‡

***Bed-sores* were developed on the parts subjected to continued pressure in cases 24, 28 and 36 treated in the Seminary hospital, and in several of the *post-mortem* series.**

***Pains in the lower extremities* were reported in four of the cases as having added much to the sufferings of the patients at an advanced stage of the disease: In the feet, on the subsidence of the primary fever, in 32; in the legs for a few days during convalescence in 33; in the heels and legs about the beginning of the fourth week in 28, and in the legs, which were greatly emaciated, late in the progress of the fatal attack, 46. But as these manifestations belong to the sequelæ of the disease rather than to the primary attack or its complications, they will be referred to hereafter in their appropriate connection.§**

Relapses.—It need hardly be pointed out at this stage of the analysis that the febrile cases under examination seldom ran a regular course from their accession to the establishment of convalescence. On the contrary diarrhœa and painful meteorism were prone to recur after they had apparently subsided or been controlled by medicine, and latent lung affections were liable to become suddenly aggravated to a dangerous intensity. Coincident with these recrudescences delirium might return, the skin acquire a greater heat and fresh crops of the rose-colored eruption make their appearance. The duration of the attack was thus in many instances either prolonged or brought to a speedy and fatal termination.

* According to Murchison the urine is scanty, high colored and acid, its specific gravity 1025 to 1030 during the first two weeks, but afterwards, and especially during convalescence, it is copious, pale, feebly acid or even alkaline and of low specific gravity. He has known it as low as 1005 or 1003,—p. 530. The amount of urea excreted during the febrile period is in excess of the normal. Parkes gives the increase at one-fifth or a total daily excretion of 480 grains instead of 400; but it is occasionally greatly in excess of this amount, Vogel having in one instance found 1200 grains and Parkes 880 grains. An altered condition of the kidney, as shown by the presence of albumen and tube-casts in the urine, may prevent the elimination of urea and induce symptoms of uræmic poisoning, a result which may also be due to reabsorption. Murchison found in several instances that the quantity of urea diminished on the advent of cerebral symptoms and increased on their cessation. In one case the quantity, which was 292 grains when the patient was delirious and unconscious, rose to 964 grains when the delirium abated and consciousness returned; in another the quantity which at first was 422 grains, fell to 352 on the appearance of delirium and stupor, and rose to 490 when these symptoms ceased. During the attack uric acid is increased and chloride of sodium diminished. This author holds that albuminous urine coincides with the occurrence of cerebral symptoms. He sums up the observations of Parkes, Brattler, Becquerel and others, and finds that albumen was present in the urine of 157 of 549 cases of typhoid fever, or in 28.6 per cent. of the cases,—pp. 531-532.

† See *infra*, p. 420.

‡ Parotid swellings and suppuration are more frequently associated with typhus than typhoid fever. Of certain cases studied by W. W. Keen, typhus was the preceding fever in 352 and typhoid in only 26,—p. 53. Murchison met with six cases of parotid bubo, which he regards as a rare complication of typhoid fever, citing Louis, Chomel and Gairdner as each reporting but one case; two of his six cases died,—p. 583. Suppurative parotitis was, however, more frequent and less fatal in Hoffmann's experience at Basle. Of 1,600 cases of typhoid fever the parotids became inflamed in 19; in 16 of the cases the inflammation ended in suppuration, and of these only 7 proved fatal; the right side was affected in 9 instances, the left in 6, and both sides in 4,—p. 178. Correspondingly in this country, while Hale and Reeves make no mention of parotitis as a complication of their cases, Austin Flint records 3 cases of parotid inflammation in 73 of fever. In his first series the parotid was inflamed twice in 30 cases; in his third series once in 14 cases, while in his second series of 29 cases this complication was not present. Commenting on these dissimilar results in his first and second series of cases, Dr. Flint points out that "parotitis is not to be regarded as an intrinsic element of the disease, but one of the events which are due to certain special tendencies incident to the disease at particular times or places—tendencies the nature of which are not susceptible of explanation with our present knowledge of the pathology of fever,"—p. 171. In his first case the right parotid became affected on the tenth day of the attack and the left on the following day. The large livid-red, tender and painful swelling immediately proceeded to suppuration. There was no diarrhœa in this case, and but slight delirium and moderate somnolency. The patient sat up on the twenty-eighth day, and on the thirty-second, when the last entry was made in the record, there was still some discharge from the abscess. In the second case the right parotid began to swell on the seventh day. This case was characterized by mild diarrhœa, tenderness, meteorism, passive delirium and somnolency eventuating in coma, the patient dying on the ninth day while the parotid continued enlarged and resisting to the touch. In the third case the right parotid became affected at the period of convalescence and proceeded to suppuration; the patient recovered. Dr. Jackson noted four cases, of which one was fatal, in 303 of typhoid fever; suppuration took place in but one of the cases, the issue in this instance being favorable,—p. 57.

§ See *infra*, p. 309.

But cases which with accuracy might be called relapses were not common.* Possibly some which ran a lengthened course may have been instances of what IRVINE has called intercurrent relapse,† but this appears to be a needless refinement in clinical study based upon the assumption of a regularity in the progress of the disease which is not found in nature. Viewing a relapse as a return of the fever with all the symptoms of the primary attack some time after the recognized establishment of convalescence, the Seminary records

* MURCHISON records 8 relapses in 100 cases of typhoid fever in the wards of the London Fever Hospital, or 8 per cent. of the cases; the same figures MÖLLER has noted them in 6 per cent. of 463 cases at Zurich, HUMAN in 8 per cent. of 548 at Leipzig, and MACLAGAN in 13 cases or above 10 per cent. of 128 cases at Dundee. It seems clear from these varying percentages that relapses are of more frequent occurrence in some epidemics than in others. JACKSON called attention in this country to the possibility of relapse in typhoid: "An error in diet and regimen is often followed by a new train of symptoms after convalescence from this disease; and these appear to me to be such as belong to this fever. It is, however, true that they are not always so strongly characteristic as to leave no doubt on the subject. If, however, they are carefully noted, they will not be found to accord with any other disease. I hope by these remarks to call such exact attention to the subject as may decide this point hereafter,"—p. 61. But he gives only one case to point his remarks. Dr. FLINT's experience was of greater interest. In his first series of thirty cases there was no relapse, and as, up to that time, he had never witnessed what might properly be called a relapse after the career of continued fever was ended, he was surprised at the statements made by some writers on the subject. But in the second series of cases "my attention was frequently called to the fact that during convalescence, and after patients had so far recovered as to sit up, and even walk about the ward, they were attacked with febrile movement, sometimes preceded by a chill accompanied by anorexia, delirium, etc., these symptoms continuing for several days, when they again began to convalesce. In some instances I was disposed to attribute this recurrence of fever to imprudence in diet, exposure to cold or over exertion, but it appeared to occur when no such cause could be assigned, and in respect to management of convalescence, the patients had the benefit of the same precautions and care as the convalescent patients were embraced in the first collection, and in the latter this sequence of the disease did not occur in a single instance. Moreover, the febrile movement and associated symptoms were out of proportion to those which might be expected to follow the imprudences just mentioned. The patients in fact appeared to pass through a second febrile career of short duration,"—p. 224. Nine cases of relapse occurred in this series of twenty-nine typhoid cases. In his third series, embracing fourteen cases, relapse occurred in but a single instance. MACLAGAN's experience runs parallel to that of Dr. FLINT. The 13 relapses in his 128 cases occurred within a period of two years, and most of them during one outbreak of the disease spreading over a period of fifteen months,—*Edinb. Med. Jour.*, April, 1871, p. 878. The large percentages mentioned at the commencement of this note are therefore not of general application. Concerning relapses MURCHISON states that after a convalescence of ten or twelve days there is a recurrence of the train of symptoms which the patient experienced on the first attack, but their course is usually more rapid. In fifty-three cases—p. 552—the mean duration of the primary attack was 27 days, the extremes being 14 and 42 days, the mean and extremes of the intermission 11.7, 6 and 25 days, and of the relapse 14.7 and 7 days. The relapse is milder than the first attack; but in two-thirds of his cases the symptoms of the former were of great severity, and fourth in a third of the cases. Recognized apparently on the third, fourth or fifth day, and MURCHISON bases the diagnosis on the presence of this symptom and the absence of any local inflammation sufficient to account for the pyrexia. SMITH has not lost the thermometric curve of relapse, but believes it to be similar to that of the primary attack in indicating the temperature curve of the first convalescence of typhoid patients.—p. 124. Intermediate between the accession of the primary fever and that of the relapse, IRVINE has next noted "a distinct remission with a tendency to defervescence," as says: "It will be noticed that the temperature of relapse rises to its highest level more quickly than in the primary fever, but I would by no means regard the instances given as to say that there was in relapse the typical morning exacerbation and evening remissions met with for the first few days in the ordinary fever. The rise in relapse in the great majority of cases is to the fifth day all but more rapid, and where great interruptions occur, there are accidents enough to account for them. The maximum evening temperature is reached by the fifth day, as occurs in primary typhoid;"—here the author, recognizing that the experience of most observers indicates the third day as the highest temperature, invites attention to his own charts in support of his statements, after which he continues: "But afterwards the curve presents a contrast to that of the latter, in which to the twelfth day the fever remains high, though with a maximum scarcely so high as in the fourth to sixth days. * * * The second stage in relapse, as compared with that of the primary attack, is cut short; and the same is true of the third stage. In relapse this stage is marked by decided fall of the temperature to the normal, and there is no *fourth week* in which deep curves prove the end of the primary attacks of primary typhoid. The absence of those exacerbations and remissions met with at the end of typhoid fever, in the cases of relapse, was noticed, but in many charts of mild (primary) typhoid which are given by several authorities this absence is met with,"—pp. 131–134. In fact this author considers the temperature curve of a relapse as differing from what is considered the typical curve of typhoid fever only by a lessened development of the normal oscillations during the periods of accession and declination, and by a shorter duration of the fastigium. This is well; but the curve of relapse and primary fever being very similar to that of relapse, he does not hesitate to suggest that many of the cases regarded as mild typhoid fever are probably relapses in patients by whom the primary fever has been disregarded. Here the argument appears to be pushed to the extreme. According to DA COSTA—*Remarks on Relapses in Typhoid Fever—Trans. Col. Physicians*, Phila., 1877, the relapse generally comes on in the second or third week, and in the second attack, and is the third. A rapid and almost without warning the patient passes from a condition of health to that of febrile condition. The eruption comes on earlier than in the primary attack, generally about the fourth day, and is as a rule more coarser and redder. It does not disappear so readily on pressure, and the first erupted spots are more likely to last until the whole rash fades. His description of the temperature curve does not agree with that given later by IRVINE: "Unlike the graduated ascending course until the evening of the fourth day, which is characteristic of typical fever, the temperature in relapse rises within twenty-four hours to a point [illegible] marking 104° degrees. Then for from five to seven days, according to the severity of the attack, the evening figures read about the same; and there is a remission of about 1°, or somewhat more, happens, very similar to what we observe in the first attack after the initial period has passed. Subsequently the same more marked morning remissions and less severe evening exacerbations, until the temperature in a zig-zag manner approaches [illegible] convalescence. Neither do we always find during the height of the relapse that the temperature is as regular as described. It may sink [illegible] monously for the first three days after it has reached the height occasioned by the returning fever, and then for three or four days more [illegible] and without any morning remission, yet subsequently, as defervescence sets in, show the characteristic zig-zag decline alluded to,"—p. 105. [illegible] interference with the growth of the nails in typhoid fever and typhoid relapse, pointing out that "with the relapse of [illegible] ridge of the altered nail growth comes to tell us how completely in every respect the fever has been reproduced; and the first [illegible] us the true meaning of doubtful symptoms, and prove conclusive of the diagnosis." A year after this paper was read Dr. [illegible] a Clinical Lecture on Relapses in Typhoid Fever, *Philadelphia Med. Times*, Vol. VIII, 1877–8, p. 433, is reported as having stated that it is the [illegible] almost coincidently with the first symptoms of relapse. In the case which formed the basis of his remarks convalescence [illegible] occurred at the end of the third week, and a few days later the temperature was at the normal. Two weeks afterwards, [illegible] in the mean time as to be allowed to dress and leave the ward, ate very largely of chicken and boiled potatoes. This [illegible] pain; the temperature ran up to 105 and the rose-rash reappeared within twenty-four hours; at the end of the [illegible] lining

† [illegible] Fever, by J. T. IRVINE, Lobelia, 1880.

are found to present but two illustrative cases, 48 and 49, while the *post-mortem* series furnishes but one case, 32. In neither of the former is the history of the primary attack given in detail; but in the latter, the patient, who remained under the observation of the recorder from first to last, was considered convalescent on the thirtieth day; twenty-five days later he was seized with symptoms of typhoid fever which soon became characteristic, death ultimately taking place from chest complications.

The foregoing analysis of the cases set aside as illustrations of pure typhoid, by weeding from the continued fevers of the Seminary hospital such as appeared to present definite indications of a malarial element, has determined the existence of certain differences between the typhoid fever which affected our troops and that recorded by writers of large experience as prevalent among the civil population of this and other countries. These may be summarized as follows:

The relative infrequency—

1st. Of nausea and vomiting at an early period;
2d. Of a moist skin during the continuance of the primary fever; and
3d. Of the pulse during the same period.

The greater prevalence—

1st. Of diarrhœa during the whole of the attack;
2d. Of dangerous congestions of the lungs and grave broncho-pneumonic complications;
3d. Of ataxo-adynamic delirium;
4th. Of dusky spots and ecchymotic patches, simulating typhus maculæ; and
5th. Of suppurative destruction of the parotid glands.

But these differences will be discussed to better advantage after the symptoms of modified typhoid have been considered.

III.—MODIFIED TYPHOID FEVER.

Instead of illustrating typho-malarial fever by febrile cases recorded under that heading, the writer has been constrained in the first instance to determine what ought theoretically to be the probable symptoms of a typho-malarial fever, and, thereafter to collect appropriate illustrations from the records of the camp fevers, whether registered as typhoid, typho-malarial or remittent. This mode of procedure exposes its results to the criticism that the fevers submitted as typho-malarial in this report are not such as were called by that name by the medical officers in attendance on the cases, but merely such as the mental bias of the editor has led him to assign to that class. Undoubtedly the first half of this criticism is well taken, for the cases presented are seldom those which were regarded as typho malarial in our camps and hospitals. The nature of the reported cases of typho-malarial fever will be investigated hereafter.* But with regard to the latter half of the criticism, certain considerations already suggested† indicate that the method adopted, while the best available for determining the characteristics of the fevers which *should* have been reported as typho-malarial in accordance with Dr. WOODWARD's views, is susceptible of yielding as accurate and trustworthy results as can be obtained in a medical inquiry concerning the consequences of unknown causes; and this is the more gratifying inasmuch as not only are the characteristics of a so-called typho-malarial fever a subject of uncertainty and corresponding interest at the present time, but the more important question of the relationship between the morbid causes of malarial phenomena and febrile conditions attended with a specific intestinal lesion are necessarily to a large extent involved in the discussion.

* *Infra*, p. 372.

† *Supra*, p. 273–5.

ONSET.—The accession of the fever in cases properly typho-malarial was not gradual and progressive as in unmodified typhoid, but was marked by distinct remissions or even intermissions in those having the febrile action of the typhoid poison preceded by a malarial attack. Perspirations or a moist skin formed no part of the clinical record of typhoid until defervescence was in progress; but in cases complicated by the presence of malarial fever the skin was at times hot, dry and rough, and at other times soft, moist or perspiring. In some the remissions seemed but an exaggeration of those which the thermometer always, and the general symptoms frequently, indicate as occurring daily in the progress of typhoid; but in others paroxysmal activity was developed at an unusual hour, as at noon-time on alternate days, or, if occurring at irregular intervals, it was unaccompanied by local conditions to which the sudden access of fever might be attributed. Assuming the alleviation or abatement of these paroxysmal features by a free use of quinine, the febrile action persisted and was associated with many of the symptoms peculiar to typhoid fever, modified in many instances by that deteriorated state of the blood which has been seen to be one of the formidable causes of danger to life in malarial cases. Death from sudden cerebral or pulmonary congestion as in pernicious malarial attacks, not unfrequently cut short the course of the fever at a period when unmodified typhoid rarely proved fatal. But in the absence of such fulminant demonstrations, defervescence began about the end of the second week, usually with exaggerated remissions and profuse perspirations, or the case was prolonged by intestinal, pulmonary or other visceral troubles, at any period of which paroxysmal manifestations were prone to recur.

Of the sixty-four cases of modified typhoid treated in the Seminary hospital, the febrile condition was developed, so far as is shown by the records, without initiatory chills in nineteen, but in five of these the continued type was assumed by cases which at their commencement were regarded as remittents. Of the remaining forty-five cases the continued fever was said to be sequent to the chills of aguish attacks in *seventeen;* it was preceded by chills, fever and perspirations in *eight* and by chills in *nineteen;* in *one* case, 70, there was a chill on the eighth day of the increasing indisposition. From the terms of the record or from the context it appears that in most of these cases the chills recurred on several occasions before the febrile condition reached its acme; but in 59, 66, 67, 74, 93 and 111 it is definitely stated that a single chill preceded the febrile attack.

Five of the nineteen cases that were not characterized by chills, and twelve of the forty-five that showed more or less evidence of a paroxysmal type in the early period, proved fatal. These results manifest, so far as the small number of cases will permit, that typhoid fever was deprived of none of its dangers by the concurrent action of the malarial poison.

The malarial character of these typho-malarial cases is sustained in most instances by other evidence than their paroxysmal onset. Chills are insufficient to establish the malarial presence, since they have been developed in cases of apparently unmodified typhoid. Concerning these, however, it may not be out of place to inquire whether malarial possibilities have been excluded from their causation. The typhoid and malarial influences are so closely allied that it is often impossible to say of a symptom which seems common to both that it is due to one and not to the other; but recurring chills, especially when followed by heat and perspirations, are so essentially manifestations of the malarial poison that when they occur with regularity as a prominent feature of the clinical picture the probable presence of that poison is strongly suggested.*

PULSE.—In one of the sixty-four cases the rate of the pulse was not recorded, and in three it was characterized as rapid, but the number of beats was not stated. In forty-two of the remaining sixty the rate did not exceed 100, except on the occurrence of pulmonary or peritoneal inflammation or in the onward progress of fatal exhaustion, as in 85, 86, 93, 98 and 99. In *eleven* of these cases its quality was not reported: in *one* it was considered

*Louis frequently observed recurring chills in the early period of his typhoid cases,—t. II, p. 259; in his forty-fourth observation aguish paroxysms recurred for many days. See also *supra*, note *, p. 284.

thready, in *six* weak or feeble, in *three* quick, in *two* of fair strength, in *five* strong, in *four* quick and strong, in *five* strong and full, in *one* quick and full, in *two* full, in *one* strong and firm and in *one* quick, full and firm. In the febrile cases already presented as examples of probably pure typhoid, fulness and strength were qualities rarely found in the pulse, but the sthenic character of the arterial excitement in those now under consideration is very notable and appears to have been connected with the existence of the malarial element. In 79 the pulse, seemingly under the influence of quinine, fell during the first week from 95 to 70 and two days later to 45, while the typhoid element was manifested by the appearance of the specific eruption; in 91 also the pulse-rate fell under the influence of quinine, and in 102, although the rate during the initiatory paroxysms was not stated, it is evident from the history that it must have been higher than later, when the rose-spots were almost the only indication of the presence of typhoid fever. Strength of pulse is also recorded in many of the cases in which its rate exceeded 100 during the primary fever; and in these the sthenic character seems to have been definitely associated with paroxysmal manifestations. In the onset of the relapse, 91, the pulse was 120, full and strong; in 95 it was rapid, full and bounding in the third week notwithstanding the occurrence of perspirations; in the interesting case, 105, the pulse exceeded 100 during the paroxysmal period of the attack, fell below that rate during the accession of the continued fever and rose to 110 at its acme; in 119 a high rate coincided with remissions and a lower rate with the progress of the continued fever until its termination in fatal peritonitis; in 104 and 110, also, the rate was higher during the early period when the febrile action remitted than later when it was continued, and in 113 and 114 rapidity of pulse was associated with paroxysmal symptoms.

From these observations it may be concluded that although the pulse was not in general more rapid in these cases than in those of pure typhoid, it was fuller, stronger, quicker and firmer in proportion to the activity of the paroxysmal element.

The febrile disturbance was accompanied in its onset by headache, pain in the limbs and back, lassitude, anorexia and thirst. In a few exceptional instances the appetite was not much impaired: thus in 89 it was good notwithstanding the brown and thickly coated condition of the tongue and the bad taste conveyed by the abnormal secretions of the mouth, and in some mild cases, as 109, it was recorded as fair throughout the attack.

In most of the cases the eyes were injected and the cheeks flushed during the period of accession: in a few instances, as in case 100, one side of the face was more deeply suffused than the other. Later in the disease, and corresponding with the development of cerebral manifestations, the eyes became dull, and at a later stage, when the patient fortunately emerged from the typhoid narcosis, they were usually clear and bright but sunken, the features pale and the skin cool.

Epistaxis was noted in twenty of the sixty-four cases. In ten of these it was an early symptom, occurring before the appearance of the rose-colored spots; in six it took place when the fever was at its height; in 74 and 81 it appeared late in the attack, and in 90 when profuse perspirations and vibices were foreshadowing the end; in 6 it was of frequent occurrence for a month before the febrile onset, recurring many times during its progress.

It does not appear that any evil effect was attributed to the loss of blood, even in those cases in which it was a specially marked symptom: nor can any notable benefit be associated with its occurrence: In 67 epistaxis was followed by the development of cerebral symptoms; in 69 its return on alternate days coincided with febrile exacerbations.

Epistaxis occurred perhaps with more frequency, if its recurrences are considered, in these cases than in those of unmodified fever. From its appearance during the accession or continuance of febrile action, paroxysmal or continued, it would seem due in part at least to circulatory excitement: and since this, as manifested by fulness and strength of pulse, was greater in the typho-malarial cases, the greater frequency of its occurrence among them may be understood. Its paroxysmal tendency was chiefly manifested at a later period when, coincident with vibices or other signs of alteration of the blood, it occurred on alternate days in conjunction with the heat, dryness of skin, headache and ringing in the ears which betokened the intermittent attack.

The Skin, during the continuance of paroxysmal phenomena, was alternately dry and moist, but when the febrile action assumed a continued type moisture ceased to appear. Occasionally intercurrent, as in unmodified typhoid, was accompanied with free perspira-

tion. *Sudamina* were frequently observed, but no *herpetic eruptions* were noted in the Seminary cases.

The ***rose-colored eruption*** was absent, not seen, or not stated as having been seen, in twenty-one of the sixty-four cases. In *three* of the twenty-one there appeared an eruption the characters of which are unspecified; in 95 this probably consisted of the typhoid lenticular spots, and in 98 of the scarlet rash which sometimes accompanies them, but its site on the genitals in 64 throws doubt upon its nature. *Nine* of the cases failed to come under observation until after the end of the second week. Nevertheless, an equal number, cases 60, 83, 85, 88, 99, 101, 104, 117 and 122, were admitted early enough to have shown the eruption had it been present. *Five* of these, however, 83, 85, 101, 117 and 122, had the malarial symptoms strongly developed. Indeed, the absence of rose-colored spots in these cases renders the diagnosis of typhoid fever somewhat doubtful, since it cannot be established that the existence of malarial paroxysms interfered with their development, for cases 102 and 105 presented the rose-rash, although the typhoid attack was mild in comparison with the febrile paroxysms which were its prelude. If these five cases be excluded from consideration there remain but *four* in which the existence of the rose-colored eruption is undetermined.—60, a light febrile attack, the history of which is not given with sufficient detail; 99, in which typhoid fever appears to have been developed on the tenth day after admission with intermittent paroxysms; 104, in which the patient was admitted on the fifth day of an intermittent attack, and 88, the record of which was begun on the ninth day of the disease.

Rose-colored spots in the forty-three cases in which they are mentioned as having been present appeared usually during the second week of the typhoid attack; but by dating the onset of that attack from the commencement of febrile symptoms their appearance was in many cases delayed beyond this period. In cases 108, 109 and 110 they were noticed on the seventeenth, eighteenth and twenty-fifth days respectively, counting from the commencement of the remittent attack. As in pure typhoid they were occasionally few in number, case 115 for instance presenting only two spots, while in other cases they were profuse and occurred in successive crops: In 73 they erupted from the tenth to the thirtieth day and in 75 from the tenth to the thirty-sixth day.

But their appearance was not in every instance that which is usually accepted as characteristic of typhoid fever. There were noted in the typhoid series exceptional cases in which the spots were of a darker color and did not disappear on pressure. Such instances were of more frequent occurrence when the typhoid fever was apparently complicated by a malarial element. In case 62 their appearance on the tenth day was followed by an eruption of a darker color on the fourteenth; in 100, rose-spots appeared on the eleventh and fifteenth days, and were followed two days later by a few dark-red spots which were imperceptible to the touch and disappeared under pressure; in 103, also, rose-spots on the fourteenth day were followed by dark-red spots on the sixteenth, and it is interesting to remark that in both of these cases the skin was jaundiced: in the fatal relapse, 91, the rose-colored eruption was preceded by a few spots of a dark-red color which did not disappear on pressure: late in the progress of 93 there occurred an eruption of dark, almost black, slightly elevated spots somewhat larger than split peas, some of which afterwards became of a light yellow color from purulent accumulations: in case 82 there is said to have been, in addition to the rose-spots, a profuse eruption the characters of which were not recorded: in 83 some pustules appeared on the abdomen about the eighteenth day.

The eruption was seldom mentioned in the defective clinical histories attached to the *post-mortem* records; and the acknowledgment of its presence in the few exceptional instances appears to have been dictated by its peculiar characteristics rather than by its mere presence. Thus in case 115 two or three rose-red spots of doubtful character were observed: in 97 a red papular eruption appeared about the end of the third week; in 51 and 86 rose-spots erupted, which in the latter case became subsequently of a dusky crimson color and unaffected by pressure.

Rose-colored spots usually appeared on the chest and abdomen; but in two cases, 70 and 74 of the Seminary series, they were found as well on the forehead and face.*

It is seen from this analysis that the rose-colored eruption was not observed in so large a proportion of modified as of unmodified typhoid cases: but the conclusion is by no means warranted that the rash was more frequently absent in the one class of cases than in the other. The date of onset of typhoid fever in a patient presenting malarial symptoms was often involved in obscurity. Cases have been instanced in which the rose-colored spots appeared for the first time, at a late date, if the initiatory malarial paroxysms were regarded as the period of onset. Cases have also been presented in which the malarial element obscured the symptoms of a mild typhoid affection, the existence of which was manifested during the second week by its specific eruption. It may therefore be assumed that in some instances, as in 122 of the post-mortem series, a mild typhoid may have existed for many days in patients subject to ill health from the malarial influence without exciting an apprehension that there was anything unusual the matter, and that these men would date their disease from some subsequent well-marked paroxysm. In such instances the eruption, if

* Dr. [illegible] noted the spots as present on the arms and legs, and in one case on the face,—p. 511.

inconspicuous and of short duration, might escape observation, and the cases, owing to an incorrect date of onset, would be regarded as having presented no eruption although under observation at the time when it usually made its appearance. Again, since in many cases the disease was regarded as remittent fever, it is fair to suppose that in some of these the specific eruption was not discovered because it was not looked for until late in the attack, when the fever had assumed a continued type and the prostration, diarrhœa and accompanying tenderness of the bowels suggested the presence of typhoid. The febrile condition lasted in the Seminary hospital case 110 for twenty-five days before the rose-spots made their appearance. Physicians in similar instances of prolonged febrile action may have accepted the absence of the spots and have ceased to look for them, although their presence might have been demonstrated at a later period. Under such circumstances failure to observe the eruption does not imply its non-existence.

Moreover, as has been indicated in the presentation of the records of the 19th Mass. Vols., and as will be shown more definitely hereafter,* there is little doubt that many cases reported as typho-malarial were due solely to the action of the malarial poison. The failure of a close scrutiny to observe the rash in such cases may have led to the opinion that its absence was common in cases of modified typhoid. However this may be, the typho-malarial series of the Seminary hospital presented in so many instances a characteristic or modified eruption as to render it highly probable that when typhoid was present it was manifested by the rash as frequently in the presence as in the absence of malarial complications.

The occurrence of ***sudamina*** appears frequently on the records; in case 6 of the 27th Connecticut the miliary vesicles coalesced into bullæ containing a turbid yellowish-white liquid, and in 9 they were developed on the site of existing rose-colored spots.

Petechial and ***ecchymotic patches.***—Petechial spots were found in two of the Seminary cases, 77 and 118, both of which recovered, and larger patches of an ecchymotic appearance in the seven cases, 68, 69, 73, 74, 90, 98 and 104. Usually these blotches were confined to the chest and abdomen, but in the last-mentioned case they covered the whole body except the face and neck. In 68, 69, 73 and 74 they appeared about the close of the third week; these cases recovered, but the others were fatal. Ecchymosed spots appeared on the abdomen in case 4 of the records of the 27th Connecticut, and spots like small blood blisters on the limbs and trunk in case 6.

It will be observed that these facts do not demonstrate a greater frequency of hemorrhagic exudations in this series of cases than was found in that which has been submitted as representative of unmodified typhoid.

Erysipelas appeared as a complication in several of the cases, as in 92 of the Seminary series and in 74 and 77 of the *post-mortem* records; the ear and side of the face seemed to be its favorite site. In the first-mentioned case it was associated with inflammation of the parotid and became gangrenous in its progress.

Bed-sores are recorded in case 113 as having occurred at a late period, but the circulation at this time fortunately became improved and the patient was soon able to walk. They were found also in 101 of the *post-mortem* series at the end of the third week, over the sacrum, trochanters and angles of the ribs of the right side.

In case 89, during the height of the fever, when the rose-rash was erupting and the patient muttering in his sleep, a ***peculiar odor*** was reported as emanating from his body. In case 6 of the records of the 27th Connecticut, an odor like that from spoiled meat was perceived about the person of the patient shortly before the occurrence of the fatal event; he was much emaciated and suffered from bed-sores.

Cerebral Symptoms.—In the sixty-four cases of the Seminary hospital series headache was reported fifty-two times, wakefulness eleven times, drowsiness eleven times, more or less of dulness or stupor thirty-one times, dizziness seventeen times, ringing in the ears twenty-six times, deafness twenty and delirium twenty-four times.

Delirium occurred in thirteen of the seventeen fatal cases and in twelve of the forty-seven recoveries. Of the four mortal cases in which delirium was unrecorded, one, 85, had the malarial symptoms strongly developed, death being preceded by stupor; 119 was fatal by peritonitis; the two other cases, 94 and 111, were not rendered in full towards their close. Among the forty cases in which delirium was absent or not stated as present, headache was reported thirty-two times, wakefulness six times, drowsiness seven times, more or less of stupor sixteen times, dizziness ten times, ringing in the ears sixteen times and deafness seven times. As the patients in many instances were not received until the disease had made much progress, it is not surprising that in twelve cases there is no evidence that headache constituted one of the symptoms of the attack. In two cases, 102 and 106, neither headache nor any

* *Infra*, page 375.

other symptom referable to the cerebral system appears on the record, while in 79, 107 and 120 headache alone; in 59, 94 and 115 wakefulness: in 117 headache and wakefulness; in 60 headache and drowsiness; in 73 headache and dizziness; in 75 and 78 headache and tinnitus, and in 82, 101, 109 and 121 headache, tinnitus and dizziness formed respectively the indications of the cerebral implication. In two instances, 80 and 81, the patients were in a semi-comatose condition, which was associated in the latter case with spasmodic contractions of unusual strength affecting the muscles of the face and extremities. This stupor did not alternate with the low delirium so common in unmodified typhoid fever, but left the patients very deaf in both cases, and with slight delirium and headache in the latter. The *post-mortem* record of case 297 compares the convulsive twitchings of the muscles of the patient to the spasmodic movements produced by moderate shocks from a galvanic battery.

Instead of dilatation of the pupil, which was recorded in several of the typhoid cases, the typho-malarial series of the Seminary hospital presents two cases, 96 and 97, of ***contracted pupil.*** In one the contraction was associated with delirium preceding the advent of lethal stupor, and in the other with a state of coma vigil which ended fatally. The pupils were also contracted in 86 of the *post-mortem* records during the stupor which was the harbinger of death; nevertheless, in case 12 of the regimental record of the 19th Mass. the pupils were observed to be dilated.

Delirium was generally of the passive character observed in unmodified typhoid, but there appeared to be a greater tendency to lapse into the comatose state than was found in cases of that fever. In some instances, however, the paroxysmal exacerbations were accompanied by more active cerebral manifestations; in 91 of the Seminary series [illegible] that the record calls walking delirium, and the patient afterwards raved and showed much strength: in 6 of the 27th Conn. the delirium was at first violent, then sullen and afterwards of a jocose character. Coma was indeed not unfrequently preceded by continued insomnia, jactitation and active delirium, as in 52 and 111 of the *post-mortem* records, or by intense headache, as in 86 and 94 of the same series. In 56 delirium and coma were apparently connected with inflammatory processes in the middle ear.

Death at an early period was usually due to coma, as in 111 of the *post-mortem* records, which terminated on the ninth day, and in 94 of the same series, which ended on the thirteenth day, although in 122 of the Seminary cases the patient is stated to have been delirious when death took place on the eighth day.

Extreme prostration and ***muscular debility,*** manifested by the position of the patient in bed, the tremulous tongue, occasional falling of the lower jaw and subsultus tendinum were as frequently noted in these cases as in those of the typhoid series. Occasionally, as in case 6 of the record of the 27th Conn., the patient recovered his intelligence while in this state of extreme debility.

The Seminary records show that delirium, although of less frequent occurrence in typho-malarial cases, was of much more serious import than in cases of pure typhoid. Delirium was present in twenty-one of forty-one favorable cases of typhoid and in only twelve of forty-seven recoveries from typho-malarial fever: but although only eight of twenty-nine cases of typhoid delirium resulted fatally, no less than thirteen of twenty-four cases of typho-malarial delirium had an unfavorable termination. These figures give expression to an increased gravity with which the malarial complication endowed the typhoid disease. It cannot be allowed that the existence of intermittent or remittent fever tended to repress the development of the cerebral symptoms of typhoid, since malarial fevers are themselves associated at times with delirium. Hence it may be inferred that the increased mortality in typho-malarial cases presenting delirium, as compared with typhoid cases having similar cerebral manifestations, was due to the coincidence of malarial disease.

THE DIGESTIVE SYSTEM.—***Vomiting*** was noted in twenty-six of the sixty-four cases and ***nausea*** without vomiting in four cases. In 108, 114 and 122 the nausea occurred early in the attack, but in 86 the fever was at its height when the patient became thus affected. In thirteen of the twenty-six cases the vomiting was recorded during the [illegible] period of the attack; four of these, 90, 92, 95 and 96, were fatal, but it does not appear that the vomiting had any prognostic value, for recovery took place in some of the cases in which it was a troublesome symptom, as in 78, in which it continued for several days, and in 82, in which it persisted for two weeks, ceasing only on the occurrence of epistaxis and perspiration. In 98, 101, 107, 110 irritability of the stomach corresponded in time with the full development of the febrile condition, and in 88 it followed the administration of quinine: one of these, 98, was fatal. The vomiting which occurred at a late period in 63, 75 and 80 was not a sign of evil omen, but in 84, 85, 89, 91 and 97 it was connected with fatal peritonitis or collapse.

Nausea and vomiting were of correspondingly frequent occurrence in the cases embraced in the *post-mortem* records. In a few instances gastric irritability was unusually distressing and persistent: In 116 nourishment had to be introduced by enemata; in 95 vomiting was associated with severe epigastric pain and inflammatory processes in the gall-bladder: in 280 it occurred early and persisted to the end.

More or less of ***jaundice*** was observed in seven of the Seminary cases: The patient's face was slightly tinged in 67 and the skin and conjunctivæ in 121, at the close of a mild febrile attack; in 84 and 100 the eyes and skin were yellowish, this condition having been associated with epigastric pain; in 103 jaundice followed the exhibition of calomel and jalap: it occurred also in 112, in which remittent and typhoid fevers coincided, and in 118,

during the activity of a remittent which was followed by a typhoid attack. In addition to these there was some derangement of the liver in 105 during its paroxysmal period. Only one of these cases, 84, was fatal. Jaundice appeared frequently among the symptoms of the *post-mortem* series; it was seen in 54, 65, 81, 95, 96, 97, 98, 100 and 111, and in these, as in those already instanced, the coloration of the skin, conjunctivæ and urine occurred generally in the early period, but sometimes towards the end of the attack.

The greater frequency of nausea, vomiting and jaundice in these cases must be regarded as symptomatic of the action of the malarial poison, since such symptoms are usual in the paroxysmal fevers, while, as has been seen, they are so often absent in typhoid that it is impossible to consider them essential features of its clinical picture.

The tongue was more heavily coated with a white, yellow or grayish fur, especially towards the base, than in unmodified typhoid. Later, as it became dark in color it lost its moisture, but it did not remain dry and brown during the height of the febrile manifestation with such persistency as in pure typhoid. It varied in its condition from day to day, being sometimes more or less moist, and at other times dry or coated with tenacious mucus; but at some period of the disease the red tip and edges, so frequently recorded in the unmodified fever, were also seen in the typho-malarial cases. Before the accession or subsequent to the disappearance of typhoid symptoms the tongue was often pale, flabby and coated as in malarial attacks, and occasionally this flabbiness persisted during the continuance of pathognomonic symptoms of typhoid. In favorable cases the fur sometimes cleaned off in patches, but more generally a white or yellow coating was observed far into the period of convalescence.

In *twenty-two* of the sixty-four cases the ***tongue*** at some period of the disease was recorded as red at the tip and edges, this characteristic being frequently noted when the rose-colored eruption was visible on the chest and abdomen; seven of these were fatal, 84, 89, 90, 92, 94, 99 and 122. The red tip and edges appeared also in *fourteen* cases, in which the tongue was characterized as flabby or pale and flabby—69, 70, 74, 75, 80, 81, 83, 85, 98, 100, 109, 111, 112 and 118; three of these, 85, 98 and 111, did not recover. In *ten* other cases flabbiness was specially noted: In 59, 62 and 121 the tongue was flabby and slightly coated; in 65 yellow-patched and afterwards white and flabby; in 67 dry, red, white-coated and flabby; in 77 dry and brown, with subsequent flabbiness and prominent papillæ; in 79 red, glossy and dry, becoming afterwards moist and flabby; in 82 white or yellow-coated, and afterwards flabby; in 106 pale, flabby and coated yellowish-brown in the centre, and in 93 pale and flabby. As none of these proved fatal except the last, it would seem that danger diminished with the distinct appreciation of the characteristics of the malarial tongue as distinguished from those of the typhoid tongue. In the remaining *eighteen* cases the tongue was characterized as follows: Coated at the base, but cleaner at the tip and edges in 102 and 108; dry, rough and coated, but cleaner and moist at the edges in 114; coated in the centre, but with the edges moist in 105 and 119; white-coated and moist in 95; heavily coated in 113; yellow-furred and fissured in 115; yellowish in 64; dry and brown in 104; brown and fissured in 107; dry, brown and fissured in 91 and 96; dry, brown and coated in 66 and 97; brown, subsequently becoming white in 86; red, dry and fissured in 71; red and clean in 73. Six of these cases were fatal, viz: 91, 95, 96, 97, 104 and 119.

Notwithstanding the oftentimes foul condition of the tongue the ***breath*** is said to have been offensive in but two cases, 100 and 113; in the latter it was referred to the existence of ozæna.

The lips, teeth and gums were covered with ***sordes*** in ten of the seventeen fatal cases, and in eleven of the forty-seven which resulted favorably, so far as the record follows up their history. Of the seven mortal cases in which the mouth was not reported as having been in this foul state, death occurred at an early date in one, 122; in two, 84 and 85, the fatal result was due to peritonitis,—in the former the patient's condition towards the close suggests that sordes may have been present though unrecorded: in 92 death was precipitated by gangrenous erysipelas and in 99 by pulmonary complications; in 94 and 95 the record slurs the details of the last stages of the malady.

The condition of the ***mouth, throat*** and ***larynx*** in these cases was sometimes, as in pure typhoid, such as to occasion more or less dysphagia and alteration of voice. The mouth and throat were covered with aphthous spots in 88; the larynx was probably congested in 77 and 81, as it certainly was in 93; in 87, however, aphonia appears to have been due to prostration, and although in 96 and 114 dysphagia must be attributed to cerebral implication, it was in the earlier stages of the latter case probably a result of local inflammatory processes.

Diarrhœa or relaxation of the bowels was present in perhaps the whole of the sixty-four cases of the Seminary series that have been submitted as illustrations of the coincidence of the typhoid and malarial poisons in the same subject. As in the unmodified cases, it was sometimes an early symptom, while at other times it was not developed until late in the attack; it lasted for a few days in some cases, while in others it not only continued throughout the fever, but was prolonged into the period of convalescence. It varied in intensity from an aggravated and exhausting flux to a slight relaxation manifested rather by lessened consistence than frequency of the passages. The stools were thin, yellowish, watery and often fetid. Usually they were passed without pain, notwithstanding the existence of abdominal tenderness; as an exceptional instance, tormina was recorded in case 87.

Diarrhœa was associated with ***hemorrhage*** from the ***bowels*** in three of the cases, 87, 92 and 93, all of which were fatal, brought out as a direct consequence of the use of laxatives, the remedy probably hastened the fatal event, for in 87 the bowels were reported as having caused much depression. Hemorrhage from the bowels took part of the period at case 148 of the post-mortem series.

As in the typhoid cases, several instances occurred in which the diarrhœal tendency was not strongly emphasized: There was no diarrhœa in 68 during the stay of the patient in hospital, but as the abdomen was marked by tenderness and gurgling, it is probable that diarrhœa may have been a symptom during the two weeks of sickness which preceded his admission. In 130 the pre-eruptive period had characterized by diarrhœa, but during the progress of the typhoid fever the bowels were commendably quiet. In 99 also the bowels were quiet, but there was much tympanites. In some cases the use of such purgatives as calomel and jalap, blue pill, compound colocynth pills, Epsom salt or castor oil shows that at the time of their administration the bowels were not loose. In 92, 97, 97 and 108 these indicators did not produce copious stools, as in 72 and 101 intestinal symptoms were developed or aggravated after their administration. In 73, which was characterized by diarrhœa at first but not throughout its progress, purgative medicines did not precede the diarrhœal tendency, while in 78, in which the conditions appeared to be similar, full doses of Epsom salt caused frequent stools and their tenderness. Lastly, in 76 with contemporaneous present and some evidences of the bowels the evacuative advancement were not persistent of undoubtedly effects until the twenty-first day of the disease, when relaxed action then set up. In some cases extracted from regimental records the bowels are said to have been constipated, as in 2, 3, 4 and 9 of the 19th Mass. and 1 and 2 of the 27th Conn.; in most of these, 1 and 3, laxatives and even powerful cathartics have produced but little effect.

Diarrhœa appears with equal frequency in the critical fevers as it does throughout the post-mortem records. In 94 and 96 there was a remittence of the diarrhœal attacks. A few of these diagnostic patients occur contiguous to the characteristic remission of the bowels that mg the attack. Thus in 96 there was constipation during the intercurrent paroxysm, lasted one day, and the lips of passive typhoid followed it, and this diarrhœa set in what adynamic symptoms were subsequently developed. In 100 also, some gastric was present, but in this instance there was cerebral disease sufficient to account for most of the prominent symptoms. The bowels were sluggish in 74 a case characterized by its frequent and copious perspirations. Constipation also in the records of 80 and 111; and diarrhœa was entirely absent from the history of 116, in which, on account of the condition of the stomach, nutrient enemata were kept by employed.

Sometimes, as in intensified typhoid diarrhœa ceased on the occurrence of perspiration at the period of defervescence. Such cases as 72, 80 and 113 are suggestive of a connection between the cessation of the flux and the increased action of the skin, and in 94 and 96 this suggestion is strengthened by alternations of hot skin with diarrhœa and free perspirations with constipation, but it is doubtful if these were cause and effect, any other relationship than that of association as results of the same cause.

Meteorism, abdominal pain and ***tenderness.***—Of the sixty-four cases of the Summary noted pain, tenderness and tympanites of the abdomen were mentioned in all except the three mild cases, 30, 101 and 116, the malady in natural case, 127, and the regular fever patient, case 122. Pain in tenderness was recorded with tympanites in thirty-eight cases and without tympanites in twenty, while in but one case, 117, was tympanites noted without concomitant pain or tenderness. The pain and tenderness of the abdomen was generally proportioned to the gravity of the attack, but in 98 in which the fatal event was due to perforative complications, the abdomen, which at times had been sympathetic became soft and stable the case.

In thirty-one cases the abdomen generally was assigned as the seat of the tenderness, but in twenty-five of these one or more localities were indicated as particularly affected: In *seven* the right iliac, in *one* the iliac, in *two* both iliac regions and in one the right iliac and epigastric, and in one the right iliac, epigastric and umbilical regions, in thirty the umbilical part, in four of these, the right iliac, in one the left iliac, and in five both regions, one of the last having the hypogastric also affected and another the hepatic and epigastric regions. In the cases in which the abdomen was not mentioned in general terms the localities were recorded as follows: In *fourteen* the right iliac region only, in two of these, the umbilical, in one the epigastric, in one the umbilical and epigastric, in one the hepatic and in one hypogastric; in six the left iliac region only, in three of these, the umbilical also and in two the umbilical and epigastric; in four both iliac regions only, in three of these, the umbilical also and in two the epigastric and hypogastric; in one both iliac regions with, in one of these, the umbilical, in one the hypogastric and in one the epigastric and hypogastric; in one the umbilical only, in one of these two that followed each other, and in two the epigastric only. In the remaining cases the abdomen was mentioned in thirty-four cases, the right iliac region in thirty-eight, the umbilical in twenty-two, the left iliac in eighteen, the iliac in three, the epigastric in nine, the hypogastric in three and the hepatic region in two cases.

Hypogastric pain was mentioned in 107 and 108 cases, it being in 96 in most patients due to the confinement of the bladder in the early period and in paralysis in a later date. In some of the post-mortem cases also, as in cases 87 and 88, it was associated with peritoneal inflammation. Epigastric pain was connected in some instances, as 94 and 106, with jaundice: in others, as 85, 101 and 105, with irritability of the stomach: in 78 the morbid feeling experienced in this region was not tenderness but a burning sensation.

Gurgling was frequently observed in connection with abdominal tenderness and tympanites.

Splenic enlargement was not noted during life in any of these cases, the swelling probably due to the cases suggested when noticed to this as a symptom of typhoid.

Chest Symptoms.—***Cough*** was present in thirty-two of the forty-four cases, usually it was slight and yielded a tender symptom of bronchitis, but in some cases, as 78, 80 and 101, it was associated with pain in the chest, and in others, as 87, 92 and 93, with definite pneumonic signs. Pulmonary congestion or œdema was found and pointed and manifested in 87, in 120 followed by the appearance indicated of a tuberculous character

Occasionally, as in 118, mucous and sibilant râles were heard although cough is said to have been absent. The ***respiration*** became accelerated in some, as in 99 and 105; it was hurried also in 106, in which cough did not appear as a symptom; and in the fatal cases, 93, 96 and 97, the breathing became greatly labored towards the end, although in the two last-mentioned instances other symptoms of pneumonic complication were obscured by the intensity of the stupor. Among the cases in the *post-mortem* records pulmonary embarrassment was observed in some, as 100; pneumonia in others, as 53 and 97. In 65 the cough was paroxysmal and prevented sleep. In 115, which was probably an adynamic malarial case, the chest affection was attributed to exposure by throwing off the bedclothes during the night. Accelerated breathing in 111 was probably due in part to pleuritic effusion.

OTHER CLINICAL FEATURES.—The ***urine*** was retained or passed with difficulty in twelve of the sixty-four cases; usually it was scanty and high-colored. No special record was made of its quantity or quality, save in 104 and 113, in the latter of which it was passed in excessive quantity notwithstanding the concurrence of free perspirations; in the former it was acid at first, afterward alkaline, large in quantity and of small specific gravity. From these cases it does not appear that retention or difficult micturition was cotemporaneous with the development of head symptoms: In 65, 73, 78, 82 and 83 the urinary trouble was noted early, but there were no marked cerebral manifestations. In 69 also, micturition was affected at an early date, but delirium did not supervene until after a lapse of ten days. In 70, with difficult micturition on the twelfth day, the only head symptom was some mental dulness, which was shown about six days later. The urinary affection occurred in the middle of the second week in 121, in the third week in 107, in the fourth week in 110, but in none of these was there any delirium. In the fatal case, 84, difficult micturition was followed in a few days by the development of cerebral symptoms, but as the latter appeared and became aggravated the former ceased. In 119, also fatal, headache and slight delirium accompanied a difficulty in retaining the urine, while the opposite condition of retention subsequently developed was not thus accompanied. On the other hand, although in many cases characterized by delirium and stupor there was an involuntary or uncontrolled passage of the urine, case 81 is the only instance in which temporary retention was reported as associated with the comatose condition. In the *post-mortem* series of cases, although delirium followed dysuria in some, as in 65, in others, as 83 and 106, there was no association of head symptoms with retention or dysuria.

Parotitis.—Swelling of the parotid appeared about the end of the third week in 69, 92 and 98; the termination was favorable in the first-mentioned case, but the two others were fatal. In 92 a gangrenous inflammation spread over the face, and death took place four days after the implication of the parotid; in 98 the swelling increased so rapidly that in a few days the patient was unable to protrude his tongue, and in six days death occurred with vibices and aggravated intestinal symptoms. In the *post-mortem* series parotid swelling was found in 53, 65 and 97.

Pains in the ***joints*** and ***muscles,*** especially of the lower extremities, were noted at a late period in the history of 115 of the Seminary series, 8 of the record of the 27th Conn. and 1, 2, 3, 4 and 12 of those belonging to the 19th Mass.; in case 4 of the last-mentioned series these pains were so severe as to cause loss of sleep and slight delirium. ***Gangrene*** of a blistered surface was recorded in case 104; gangrenous erysipelas of the face has already been noted as having been present in 92; gangrene of both feet occurred in 5 of the records of the 27th Conn. and in some of the cases of the *post-mortem* series. These will be referred to hereafter in speaking of the sequelæ of the continued fevers.*

RELAPSES.—The progress of typho-malarial cases was even more irregular than that of typhoid cases, for in addition to the complications and recrudescences to which the typhoid element rendered them obnoxious, their course was liable to interruption and prolongation by intercurrent exacerbations due to their malarial element. But well defined relapses of the typhoid phenomena were as infrequent as in unmodified typhoid.

Relapse was recorded in 59 and 91 of the Seminary series and in 56 of the *post-mortem* series. In the first-mentioned case the relapse was manifested by chill, fever and perspiration, wakefulness, diarrhœa, thirst and some febrile heat, while the pulse, although strong and full, was not accelerated, beating only at the rate of 66 per minute; rose-colored spots appeared on the eighth day, after which defervescence took place, diarrhœa subsided and the appetite returned. The second case presents a different record: Fever, diarrhœa, delirium and unconsciousness were at once developed; modified red spots appeared on the third day, about which time the delirium became violent; this was interrupted by a severe chill with the subsequent establishment of the typhoid condition, during which, on the sixth day, rose-colored spots erupted: death occurred on the seventh day from perforation. In the third case the details of neither the primary fever nor the relapse are given; but it is stated that during the subsidence of the febrile action delirium, coma and death occurred in connection with inflammatory processes in the ear.

FATALITY.—Lastly, it is of importance to point out that the fatality of these cases was considerably greater than that of the typhoid series,—in fact, their percentage of fatality was greater than the sum of the percentages of typhoid and malarial diseases. Of fifty-one Seminary cases of unmodified typhoid ten were fatal or 19.6 per cent., while of sixty-four cases in which this disease was influenced by the coincidence of malarial phenomena seventeen or 26.6 per cent. ended fatally. These results are consistent with medical experience in

*See *infra*, page 309.

analogous cases. No one will deny that when pneumonia occurs in the progress of typhoid or malarial fever the patient's danger is correspondingly enhanced.

In summarizing the differences between the symptoms of the typhoid affection *per se* and the same disease as modified by the intercurrence of active febrile conditions usually attributed to the malarial influence, the following points require mention as generally characteristic of the latter:

1. Paroxysmal invasion with perspirations;
2. Greater strength and frequency of the pulse during the febrile access;
3. Intercurrence of febrile paroxysms at any stage;
4. The paroxysmal recurrence of epistaxis;
5. A doubtful infrequency of the eruption and an undoubted modification of its characters in certain cases;
6. The pale, flabby, moist and coated condition of the tongue;
7. The greater frequency of nausea, vomiting and jaundice;
8. A more defined tendency to constipation in the few cases not characterized by relaxation or positive diarrhœa, and the frequency of abdominal tenderness beyond the limits of the right iliac region, especially towards the epigastric and left iliac regions;
9. The greater gravity of the cerebral symptoms and the earlier period at which death was, in some instances, occasioned by malarial coma;
10. A greater fatality or ratio of deaths to cases.

It appears, therefore, that when these cases as a whole are compared with those of pure typhoid, there are manifested certain clinical differences which were marked in proportion to the activity of the malarial phenomena; when the latter were pronounced there was no difficulty in determining the interference with the course of the typhoid fever, provided the occurrence of the characteristic symptoms of that fever indicated its presence. But, as may be seen in the records of the 19th Mass., there were occasionally presented obscure cases in which it was impossible to say whether the sub-continued fever which prostrated the patient was due solely or chiefly to one or other of these fever-poisons, since the characteristic symptoms of neither were distinctly marked, while well defined cases of each of these febrile conditions were occurring at the same time in neighboring commands and had occurred only a short time before in the regiment itself.

Further inquiry into the nature of the typho-malarial cases of the war must be postponed until after their presentation from the *post-mortem* standpoint.

IV.—TYPHOID FEVER, MODIFIED AND UNMODIFIED.

Sequelæ.—But whether the febrile cases that occurred among our troops were typhoid or typho-malarial certain sequelæ were prone to follow. Persistent debility, occurring alone or in association with tubercular developments or some local morbid conditions, often incapacitated the soldier for further military service. Diarrhœa was the most frequent of the engrafted diseases, owing to the prevalence of its causes and the condition of the intestinal lining in convalescents from fever: Following it in order of frequency were inflammatory processes in the lungs. Diseased conditions of the liver, spleen or kidneys were also found. Many of the cases already submitted illustrate these occasional consequences of the febrile attack, and others of a similar tenor will be found in the *post-mortem* records.

Perhaps the most interesting sequel presented by the records is the pain in the feet and legs which constituted a prominent and distressing symptom in many of the cases. It occurred, but not with frequency, in the Seminary cases; it constituted a characteristic of those treated by Surgeons Dyer of the 19th Mass. and Barr of the 36th Ohio,* and it is mentioned in the report of Surgeon McLaren's Board of Inquiry† and in several of the

*See report, *infra*, p. 327. †*Infra*, p. 365.

cases taken from the records of various general hospitals. Occasionally it is noted in Sanitary reports, as in the following:

Surgeon HARVEY E. BROWN, *70th N. Y. Vols., Camp Mahan, Va., October* 16, 1862.—A number of severe cases of typhoid fever presented the peculiarity that during convalescence there was a remarkable tenderness of the feet and ankles; the patient would cry out with agony at the mere weight of the bedclothes, and a touch of the hand gave excruciating pain. I found but little relief in this distressing symptom from cooling lotions or poultices; perhaps I was more successful with the use of hog's lard smeared over the foot than with any other remedy. In most of the cases this soreness gradually disappeared, but loss of power in the feet remained for many weeks, although the patients in other respects grew strong and well. In one case large abscesses formed on the dorsal surface of the foot; these discharged and the foot got well.

Owing to the meagre character of the records it is difficult to appreciate the cause of this pain in the cases in which it is mentioned. In some it was probably due to fatigue induced by the first efforts of the convalescent to test his returning strength. Muscular and rheumatic pains may also be ascribed to degenerative changes arising from mal-nutrition, the poverty or abnormal state of the blood being manifested by an œdematous condition of the feet and ankles or by boils, subcutaneous abcesses or ecchymoses. But the occurrence of gangrene in cases 40–42, from the records of various hospitals, and in six cases of the *post-mortem* series,* is of importance in this connection. The severe pain mentioned as the only abnormal phenomenon in some cases, as in those of the 36th Ohio, was associated with swelling in others, in two of Surgeon KENDALL's cases with discoloration, and in certain cases with ulceration, superficial sloughing and even gangrene necessitating amputation above the ankle joint. Surgeon BARR viewed the occurrence of this pain as a favorable sign indicating the commencement of convalescence, but a larger experience showing its probable connection with a deadly lesion supplies ground for regarding it with much anxiety.

Surgeon J. H. TAYLOR, U. S. Vols., in his report, April 10, 1863, on the occurrence of gangrene of the toes in the Third Army Corps, Army of the Potomac, attributed this morbid condition to exposure to cold. In the field hospitals of the corps he found six cases, one of which was manifestly a true frost-bite. In five the gangrene set in during convalescence from typhoid fever, but in the history of each there was detected an exposure to which, in the debilitated condition of the patient, the local injury was ascribed. In one of these cases, that of Adam Hayerd, 122d Pa., amputation was performed at the upper third of both legs, subsequent to separation of the feet, and at the time of Surgeon TAYLOR's enquiry the stumps were healed. Gangrene in this case set in during the intensely cold weather that followed the battle of Fredricksburg and while the patient was under treatment for typhoid fever in the regimental hospital. A suspicion that scurvy was concerned in the development of these cases was not sustained by the results of the investigation.

In the cases above reported the disease has presented a remarkable uniformity in its commencing stages and in the parts attacked, invariably beginning at the ends of the toes and generally with the greatest severity in the little toes. I failed to detect in a single instance the evidence of its having manifested itself at any point above the ankle joint or anywhere except in the parts immediately involved as already indicated.

In every case the constitutional symptoms have been severe and such as are usually found in mortification supervening on injuries involving sudden loss of vitality. Great depression of the vital powers, rapid and feeble pulse, with cold sweats in some instances, have marked the course of the disease. It is true that most of the cases were enfeebled and debilitated by typhoid fever at the time the disease in question manifested itself, and that a great part of the depression might be due to the primary disease; nevertheless the change was decidedly marked, particularly in the pulse, which became more frequent and irritable. This change took place immediately upon the accession of the gangrene and not, apparently, from the gradual diffusion of any scorbutic taint or latent cachexy. From the absence in every case of general symptoms indicating scurvy as the cause, and the evidence connecting the gangrenous condition with exposure to cold, I am compelled to assume the latter to be the cause. It may be alleged that in two of the cases the patients were not exposed to a sufficient degree of cold to produce freezing at the time the disease manifested itself—that they had been in division and regimental hospitals for some time previous, where it

*See *infra*, p. 432.

was not probable that such an injury would happen. But by noting the facts we find that in one case the patient was sent from regimental to division hospital on the 4th of March, and that immediately after becoming warm in bed he was seized with severe burning pains in the ends of his toes, and that the following morning gangrenous patches were observable. It is reasonable to infer that this patient was frost-bitten while being conveyed from one hospital to another. The case becomes much stronger when we remember the man's condition at the time, and know that such accidents were of frequent occurrence during the Crimean war, even where the sick were transferred to no greater distance than probably intervened between the hospitals in question. The history of the other case is very similar. The patient had been sick in division hospital four weeks with typhoid fever; he was returned to his regiment January 27, where he remained about two weeks, when he was again sent to division hospital. Within forty-eight hours after his re-admission symptoms of gangrene were manifested in the ends of his toes. The same inference is deducible in this case,—that the man was frost-bitten while being conveyed from one hospital to another. It will be remembered that he was in hospital for six weeks prior to the attack of gangrene; that his diet had been generous and varied; that at the time of his first admission and during the continuance of his stay no symptom of scurvy was discernible, but that immediately after being removed from one hospital to another mortification set in.

In conclusion I will add that it appears to me scarcely possible for scurvy to so affect the system as to produce ten gangrenous spots each in the end of a toe without manifesting itself still further through some one or more of its ordinary concomitant symptoms.—*Surgeon* J. H. TAYLOR'S *Report.*

Sloughing of the cornea occurred in case 39 of the records of various hospitals.*

Swelling of the parotids with frequent suppuration, which has been mentioned in connection with both typhoid and typho-malarial cases, occurred as a sequel or late complication in the cases 43–50 from various hospitals. Surgeon BARR gives the only reference to a similar condition of the submaxillary glands, and records the testicles as having been affected in two instances. Purulent deposits in other parts of the body are noted in cases 34–36 of the series last mentioned and in several of the *post-mortem* records.†

Sequelæ involving impairment of nervous power are illustrated in cases 51–61 from various hospitals. These cases do not differ from those described by MURCHISON, NOTHNAGEL and others, as occasionally occurring after ordinary typhoid fever. They consist of partial paralysis of various parts and include one case, 59, of paralysis agitans, in which the tremors persisted notwithstanding the return of muscular strength, one, 60, of cerebro-spinal fever, with death from coma on the second day of the attack, and one, 61, of paraplegia from spinal meningitis, in which a gradual improvement took place, so that in about four months the patient was able to make very good use of his legs and was strong and healthy in his general condition. In 51 the right leg became œdematous and paralyzed; the œdema disappeared in two weeks, but a considerable time elapsed before the power of free motion was restored. In 52 the lower extremities were partially paralyzed, the result being discharge from service on account of a slow and unsteady gait; in 53 paraplegia was associated with some atrophy of the right leg, but the patient, after a course of crutches and canes, was eventually returned to duty; in 54 there was progressive loss of motion and sensation in the lower limbs until a state of almost complete paraplegia was reached, after which the patient improved, but was discharged at the end of six months as incapable of further service; in 55 hemiplegia improved rapidly, but left the soldier unfit for duty owing to contraction of the right leg; in 56 there was no improvement in a paralyzed left side at the end of four months. All these cases occurred during convalescence; in fact, in 54 the patient is described as having been doing well for seven weeks, when he was taken with the gradually increasing paraplegia. But in 57 and 58 the patients were prostrate at the time of seizure: In the former hemiplegia occurred during the height of a sequent pneumonia; this man was discharged after several months, able to walk with the aid of a cane but with the arm powerless. In the latter the right arm and left leg were paralyzed during the unconsciousness of a late

* Dr. WOODWARD says, in the second part of this work, p. 501, that no case of corneal ulcer occurring in the later stages of fever was brought to the notice of the Surgeon General's Office during the war. See also Case 49 of the *post-mortem* records.

† See *infra*, page 432.

period of a severe typhoid attack; the case ended in discharge twelve months afterwards on account of atrophy of the leg and inability to flex the foot.

Relapses.—Besides the instances of typhoid relapse in the typhoid and typho-malarial cases, 48 and 49, 59 and 91 of the Seminary series, and 32 and 56 of the *post mortem* records, 63–65 from various hospitals were regarded by their medical attendants as cases of relapse in typhoid fever. In 63 the details of the primary attack are not given; but the patient died, after passing hemorrhagic stools, on the fourth day from the second access of fever, typhoid symptoms and rose-colored spots having been developed in the meantime. In 64, three weeks after the apparent establishment of convalescence, the patient was seized with severe diarrhœa, which terminated fatally in twenty days; but there is nothing on the record to show that it was a true relapse. In 65, which ended favorably, both the initial and sequent attacks are detailed, but the evidence of the presence of typhoid is by no means convincing.

Second attacks.—The records of the series from various hospitals furnish only two cases, 66 and 67, of typhoid attacks in men who had suffered from the disease at a previous period. In one case the second attack was well defined and under observation, but the first rested on the testimony of the patient, corroborated, with some details, by his father; in the other a clear history of the anterior attack is furnished, and the second, typho-malarial in its character, is also described with precision. The patient, in 75 of the Seminary series, is said to have suffered from typhoid fever two years before his admission with a pronounced typho-malarial attack.

Extracts from reports, etc.—A few papers on file in the office of the Surgeon General give clinical descriptions of the continued fevers which prevailed in our camps and hospitals. These are herewith presented. Abstracts of most of the journal articles on this subject are appended as notes.*

* J. J. Levick,—*Med. and Surg. Reporter*, Phila., Vol. VIII, 1862, p. 283,—in a clinical lecture on six cases of miasmatic typhoid fever from the seat of war summarizes the principal features of the disease. In some there had been an ill-defined forming stage during which the patients, although much troubled with diarrhœa, would attend to their ordinary duties; in others the attack was sudden, coming on with chilliness and intense headache. Diarrhœa was a constant symptom; chilliness or rigors affected all the patients; a flushed face and slight cough, with the usual bronchitic râles, were also noticed in every case. At the beginning there were exacerbations and remissions, and in connection with the latter was found a moistness of the skin at certain periods of the day, the forehead being covered with large drops of perspiration; but this was in no instance critical,—it ceased and recurred. Headache, present in varying degree in every instance, was sometimes described as *splitting* or *battering;* there was always a sense of weight and weariness in the eyes, severe pain in the back of the neck and between the shoulders rather than in the loins, and restless aching in the lower limbs. The tongue was more or less furred, but not heavily coated nor disposed to dryness as in typhoid fever; thirst was moderate; loss of appetite complete. The pulse in two cases reached 120; but with these exceptions it was rarely above 90, and in one it was as low as 60; it was soft although in no case alarmingly feeble. Epistaxis was not always present. The abdomen was more or less prominent, but not decidedly tympanitic. There was none of the mental dulness of enteric fever, so that even in the comparatively advanced stage of the disease questions were answered intelligently and the patient showed interest in what passed around him; in no case was there well-marked delirium. In another article—*Amer. Jour. Med. Science*, Vol. XLVII, 1864, p. 404—he recapitulates the substance of his former lecture, and adverts to the invariable presence of the rose-colored eruption and disease of Peyer's patches, the latter indicated by diarrhœa which was either present or readily induced by a small dose of castor oil. Sanford B. Hunt, Surgeon U. S. Vols., in a communication to the *Buffalo Med. and Surg. Jour.*, Vol. II, 1862, p. 202, describing the camp fever which he observed in a recently recruited New York regiment, says that for a few days the patients felt weary and stupid, had headache and pain in the back, loss of appetite and fever,—skin hot and dry, pulse 100 or more, tongue dry and brownish. Suffering little pain, they frequently were cheerful throughout, seeming rather lazy than sick. Diarrhœa set in; the pulse reached 120, but seldom rose higher; sordes collected about the teeth and the tongue became cracked. After a time these symptoms declined, the tongue being the last to regain its normal state. A good appetite on a dry tongue was not uncommon. Joseph Klapp, Act. Ass't Surg., U. S. A., in an article on *Typhoid Fever in our Military Hospitals,—Med. and Surg. Reporter*, Philadelphia, Vol. IX, 1862–63, p. 18,—says that a large proportion of the fever cases admitted into the hospital in which he served bore a considerable resemblance to ordinary typhoid. In giving a brief notice of the more obvious features of the army fever, he remarks that deafness was infrequent and slight; five cases had the dull, heavy, stolid expression of countenance so often found in pure typhoid; delirium was present only in the most unfavorable cases; sleeplessness was scarcely complained of. In most cases there was diarrhœa, the discharges being thin, yellow and more profuse perhaps than in enteric fever; pain on pressure was felt in the right iliac region and over the abdomen generally, but in a less degree than is usual in typhoid. The rose-colored eruption was present in most instances, sudamina in but few. Convalescence was more rapid, and as soon as it began the countenance acquired a brighter and more cheerful expression; severe cases had a listless, indifferent, yet not stupid expression, a dark mahogany color of the face, sordes about the teeth and a dry tongue disposed to become aphthous in the progress to recovery. Chronic rheumatism, never complained of before, affected many, but not until they had in a great measure recovered their strength. Most of the patients came from the region of the James and Chickahominy rivers and were benefited by quinine. When tenderness of the abdomen, tympanites and acute diarrhœa co-existed with well-marked typhoid symptoms, oil of turpentine was given, with good nourishment, wine, whiskey or milk-punch; warm rubefacient cataplasms over the abdomen afforded great relief. Henry M. Lyman, Act. Ass't Surg. U. S. A., writing from University Hospital, Nashville, Tenn., August 6, 1862,—*Amer. Med. Times*, N. Y., Vol. V, p. 109,—says that typhoid fever was of frequent occurrence in the spring of 1862, and that "if all the cases of fever attended with rose-colored spots upon the skin, diarrhœa, etc., are to be reported as

Remarks on the Typhoid Fever of the Army by Ass't Surg. JOS. R. SMITH, *U. S. A., Seminary hospital, Georgetown, D. C., Sept.* 30, 1862.—Washington and its environs seem to have been a favorite habitat of intermittent fever for many years past. In common, however, with many other places in this country, the type of prevailing fever has been steadily undergoing a change, intermittents gradually giving place to remittents and the latter in turn to typhoid. Two hundred and eighty-eight cases of fever have been treated during the past quarter in the Seminary hospital; twenty-two were intermittent cases, one hundred and thirty-seven remittent and one hundred and twenty-nine typhoid; one of the remittent and twenty-three of the typhoid cases were fatal.

Intermittent and remittent cases presented no peculiarities, and generally yielded promptly to the free use of quinine. Those cases, however, which proved most obstinate assimilated gradually to typhoid, and in a number there was doubt as to the diagnosis. The cases of remittent fever diminished in frequency during the month of September, and those of typhoid increased in a greater ratio. This was probably owing not simply to a greater prevalence of typhoid, but to the fact that stringent orders were issued prohibiting the sending of light cases of disease from camp to general hospitals; in consequence light remittents were retained for treatment in camp, while those febrile cases that were more unpromising in their appearance were sent to the various general hospitals.

Under the head of typhoid fever I include only those which presented typhoid symptoms from their reception into hospital, though some of them, according to the history obtained from the patients themselves or their former physicians, evidently commenced as remittents. According to my own observation nearly half of the cases originated as remittent fevers,—at all events they presented well-marked daily remissions and exacerbations. In the hospital, where in such cases the utmost attention of the attendant medical officer was given and even the shade of a remission watched for, that the great specific, quinine, might be administered, either only a slight trace of a remission would be discovered, refusing frankly to declare itself under appropriate doses of quinine, or a continued fever would be at once established with all its usual and familiar symptoms. Cases typhoid *ab origine* were usually recognized as such within a very few days. They began with chills or sensations of chilliness, headache, pains in the back and aching limbs, soon followed by a rapid pulse, hot skin and feelings of debility and weakness. Cases of this kind presented in general the greater part of the following symptoms: Chills, headache, pains, feeling of prostration, hebetude, deafness, tinnitus aurium, subsultus tendinum, heat of skin, delirium, capillary congestion, epistaxis, accelerated pulse and hemorrhage, sudamina, petechiæ, eruptions, sweats, tongue foul and coated or dry and harsh, sordes on teeth and lips, meteorism, borborygmus, iliac or abdominal tenderness, constipation or diarrhœa with involuntary evacuations, vomiting and gastric irritability, peritonitis, retention of urine and apparent convalescence followed by relapse. The disease was ordinarily ushered in by a chill with cephalalgia and pain in the back and limbs. Within three or four days, however, these symptoms almost entirely gave place to a sensation of muscular weakness. Hebetude was marked in most of the cases. The patient could be easily roused from a state of stupor to answer questions; he would protrude his tongue if asked to do so, but would often forget to draw it back. The hearing was frequently impaired, although the patient might not recognize his deafness. Delirium was a constant symptom; it was rarely violent, generally low, accompanied by muttering or talking and a desire to leave the bed for some senseless object, a desire which he endeavored to gratify whenever the attention of the nurse was withdrawn; but even when delirious he could often be roused to give a sensible answer. Tinnitus aurium was frequently absent, but subsultus tendinum and general jactitation were among the constant symptoms in severe

cases of typhoid, we must conclude that the disease is modified in many particulars by its intimate relation with the causes of the remittent form which has thus far marked at least nine-tenths of the cases of fever which, during the last three months, have been placed under my observation." The same journal, in its issue of July 12, 1862, has an editorial headed *Reports of Hospitals*, which, in referring to the experience of the Ladies' Home hospital, New York City, states that the malarial fever met with there had its symptoms mingled with those of true typhoid. Diarrhœa and rose-colored spots were almost constantly present, and the fever exhibited a marked disposition to exacerbations and sometimes to collapse,—patients presenting nothing untoward in their condition, and with the mind perfectly clear, would, in three or four hours, and occasionally in less time, be found pulseless, the surface moist and cold and death imminent. When in this condition they would converse intelligently and express themselves well enough to sit up. When asleep the decubitus was dorsal and the appearance of the countenance that peculiar to severe cases of typhoid fever, but the patient could readily be roused, and when awakened showed no bewilderment. In severe cases the tongue was dry and disposed to crack. The appetite generally was not much impaired. Scorbutus was a frequent complication, and suppuration of the parotid gland was present in a few instances. IRVING W. LYON, House Physician, Bellevue hospital, commenting on parotitis as a complication of typhus,—*Amer. Med. Times, N. Y.*, Vol. VIII, 1864, p. 87,—states that in the summer of 1862 he saw in the hospital near Corinth, Miss., about one hundred and fifty cases of typho-malarial fever with parotid swellings in ten per cent. of the cases and on both sides in half of the number affected. Suppuration almost invariably took place if the patient lived long enough. This was regarded as an unfavorable complication. Patients who recovered after having been thus affected were slow in gaining strength, the discharge from the gland continuing for a long time. S. K. TOWLE, Surgeon 30th Mass., in an article *Notes of Practice in the U. S. A. General Hospital, Baton Rouge, La.*,—*Boston Med. and Surg. Journal*, Vol. LXX, 1864, p. 49,—speaks of the mixed characters of the fevers prevalent in that section. The remissions in remittent fever were less marked, and often nearly disappeared after two or three days, while, with the continuance of the fever, enteric rather than gastric symptoms became prominent. He holds that cases registered as typhoid fever were without doubt of malarial origin. These had not the rose-colored eruption, and on admission had already lost the early diagnostic features, retaining only the prostrated, low vitiated, semi-conscious condition of the last stage of severe typhoid fever. The mortality was much greater than in pure typhoid, and in those that eventually recovered convalescence was slow and halting. "I do not remember to have seen this season amongst those who had spent last year in this department a single case of typhoid fever such as we see in New England, and most of the cases occurring amongst the new-comers after they had been here two months were decidedly modified by the miasmatic surroundings. Indeed, one could almost tell how long a New England fever patient had been in this section of the country by the type of his disease. a genuine case of uncomplicated typhoid being strictly pathognomonic of a recent down-east Yankee. * * During the spring I saw at the different regimental hospitals, by invitation of the surgeons of several New England nine-months regiments, a great many severe cases of typhoid fever (then quite prevalent in the new regiments here), and although most of them did not exhibit any remissions, and hence had not been thought complicated at all with malaria, yet the fact was indisputable that they did better after the introduction into the treatment of full doses of quinine during the first part of the disease; and in cases in which quinine had not been given at first, it often, though not invariably, was of apparent benefit in somewhat small doses in the later stages." After adverting to the various influences that modify camp fevers he remarks: "Hence it follows that few of the serious cases of malarial disease one is called upon to treat after six months service in the army are either simple, well-defined or exactly described by any of the old terms, as intermittent, remittent or typhoid, but partake in some degree of the nature of all; and from the previous surroundings of the patient are inclined to rapidly assume a decided typhoid type."

cases. In aggravated cases the nervous system seemed entirely prostrated very early in the disease, the above-described symptoms being developed by the fifth or sixth day. Capillary congestion was well marked in the majority of cases; the brown color of the cheeks, disappearing on pressure and but slowly returning after the removal, helped much to impart that expression of the countenance known as the *facies typhosa*. Epistaxis was of rather infrequent occurrence; in two cases, however, it was so severe as to become of serious import. Hemorrhage occurred from no other part except the bowels as an effect of erosion of the walls of a bloodvessel. In every case that I noticed the pulse was accelerated from the beginning of the attack, ranging from about 90 to 110, but in many cases it diminished in frequency coincidently with the disappearance of headache and pain in the back and limbs, so that after three or four days the pulse ranged from 85 to 100 or a little more. I have been accustomed to consider the frequency of the pulse and its strength or weakness as furnishing important prognostic indications. Cases in which the pulse exceeded 128 seldom ended favorably; sometimes in fatal cases it ranged for days beyond this number, gradually running up to 140 or higher, until, with imperceptible pulse, the patient died. An unfavorable result was common also in those cases in which there was a want of correspondence between the force of pulsations in different parts of the body, as indicated by the action of the heart and the beating of the carotids, the abdominal aorta and radial artery, sometimes a labored cardiac action producing but a weak arterial pulsation. Petechiæ and vibices were present in many cases, particularly on the abdomen, less frequently on the chest and but rarely on the limbs. Sudamina were of constant occurrence, profuse all over the abdomen, but in no instance upon the limbs or face. These sweat-vesicles burst shortly after their appearance, and in many cases reappeared in a succession of crops during the whole attack. Their presence or absence seemed of but little value as an index of mildness or severity. The typhoid eruption was not an invariable symptom. When present it appeared usually during the second week, chiefly on the abdomen and thorax. Sometimes only two or three spots were discovered after a careful examination of the surface, and in a certain number of cases no eruption whatever was observed. Some of these non-eruptive cases were as severe as any, and when fatal exhibited no variation from the ordinary *post-mortem* lesions. The digestive system early shared in the morbid actions constituting the febrile condition. From the beginning the tongue was covered with a white coating which seldom disappeared during the disease, or with a black coat, the tip and edges being red and angry-looking; it was often moist, sometimes flabby, and frequently dry and harsh, much fissured and covered, like the teeth and lips, with sordes. In fatal cases this state of the tongue persisted to the end, but in favorable cases it cleaned from the centre to the edges or *vice versa*. One of the most encouraging appearances presented by the tongue, noticed chiefly about the period of convalescence, was the assumption of a delicate film of white on the cleaned surface. Sordes could in general be wiped or washed away, and attention to this apparently trivial act was productive of much comfort to the patient. The pathological changes taking place in the abdominal cavity early invited attention by their local indications. The skin, particularly that of the abdomen, was apparently much raised in temperature, this being sometimes so striking as to constitute the *calor mordax* of the books. I noticed a very frequent connection of this symptom with violent delirium. The abdomen was sometimes flat or cup-shaped, with every pulsation of the abdominal aorta plainly visible, at other times tumid and swollen or meteoric, resonant and rumbling on the slightest pressure. In several instances distention was decidedly relieved by the introduction of flexible tubes *per anum* to allow the gas to escape. Tenderness on pressure was one of the most frequent phenomena, markedly exhibited in the right iliac region. When slight this generally displayed itself by an involuntary shrinking or a contraction of the rectus to protect the parts beneath from pressure. Sometimes the tenderness extended along the course of the colon into the left iliac region, and occasionally the whole abdomen was affected and the patient so sensitive as to shrink from even a motion to bear upon the parts. The bowels were generally irregular, sometimes constipated, but more frequently affected with a persistent and debilitating diarrhœa, the stools usually blackish in color, of a very offensive odor and occasionally bloody. Vomiting and gastric irritability were by no means prominent symptoms; in a few cases, however, it was found impossible to relieve them, the matter vomited being sometimes yellowish and smelling of bile, sometimes watery, sometimes black and in one instance containing blood corpuscles. Toward the end involuntary dejections added to the disagreeable symptoms, though some cases recovered after reaching this stage. The muscular coat of the bladder seemed paralyzed in quite a number of cases and required the regular use of the catheter; this, however, did not indicate their gravity, for many such cases recovered.

The fatality of the disease has been 23 in 129 cases, or one in a little more than five and a half cases; but this rate has presented great variations. Thus, in the first fourteen days of September, 15 deaths occurred. Not only was this owing to the fact before mentioned, that at this time the custom of sending only the most serious cases to general hospitals was strictly adhered to, but it seemed as if some fatal epidemic influence struck suddenly all those who were laboring under this disease. Those who entered the hospital at that date came under its influence, those who had been in hospital a longer time were equal sufferers, and the same mortality extended to the other hospitals in the city, both the neighboring and remote, thus proving its independence of local causes. I have been unable to discover anything to account for this increased mortality, which subsided toward the end of the month.

The question of diagnosis, while of much interest, is one which an elementary report like the present cannot pretend to treat. Where an assemblage of symptoms such as I have enumerated was presented there could be of course no doubt in the diagnosis; but so great was the variety in the nature, number, severity and combination of the symptoms as on several occasions to arouse the suspicion that two distinct diseases were present with certain features in common. The closest and most careful investigation of the symptoms and *post-mortem* appearances failed at the time to confirm such suspicion, and every day and every new observation since has convinced me of its incorrectness. To illustrate: There has entered the hospital a patient whose previous history exhibits all the symptoms of an ordinary pyrexial attack. At present, however, the symptoms are as follows: Pulse 80 to 95; face but little congested;

heat of skin nearly natural or not much increased over abdomen; tongue clean or somewhat dry; very slight or no pain or tenderness in the abdomen; bowels regular; appetite impaired; complaint of slight weakness, much increased by exertion; sudamina and profuse perspirations but no eruption. This assemblage might easily escape recognition as the combined symptoms of a fever case. If this patient be carefully treated, confined to his bed, the state of the secretions watched and regulated and all stimulating food disallowed, the pulse in two or three weeks will fall to or below the natural standard, the tongue assume the delicate whitish appearance I have spoken of as characteristic of convalescence, and with returning appetite, strength and health will reappear. Should, however, the case be neglected and the patient continue his customary or other work, overlooking the premonitions of approaching disease, soon the unheeded warning will speak in language not to be misunderstood. Accelerated pulse, gastric irritability, high febrile action, abdominal tenderness and other typhoid symptoms are speedily developed and death is the usual issue. Now the question arises: What are the elements common to two such dissimilar conditions as are here described? Is there anything that may serve as a connecting link by which these apparently isolated diseases may be joined as one, or are these features of resemblance mere coincidences that might be expected equally in a case of delirium tremens or carcinomatous degeneration? I shall endeavor to give my impression of what is common in all these cases: I have found abdominal tenderness one of the most constant phenomena of some stage of this disease; in fact, without a particular reference to my notes, I do not recall a single instance in which pressure over the right iliac region or some other portion of the abdomen less frequently, did not elicit symptoms of tenderness or uneasiness, either an acknowledgment of pain or an involuntary shrinking from the pressure. The occurrence of sudamina and profuse sweating, without possessing any great pathological significance that I am aware of, has yet seemed to me to possess more or less diagnostic value, and though some cases of fever ran their entire course without them, in the majority several crops have made their appearance, filling up, bursting and leaving the skin in a sort of brawny desquamation. The tongue is generally altered in this disease, presenting the appearance I have before described. To be sure it is sometimes coated in other diseases, but to me the typhoid tongue, with sordes on the teeth and lips, has a pathognomonic appearance. The slight acceleration of the pulse, too, invariably directed my attention to the true state of the case, being neither natural nor yet sufficiently rapid to arouse suspicion of inflammatory pyrexia, but remaining for a number of days at a certain state of moderate acceleration; and here I desire to call attention to a phenomenon in the natural history of the disease which I have hitherto neglected to mention, viz: the occurrence, in frequent cases, of a more or less perfect apyrexial period amounting, in some instances, to almost apparent convalescence, which lasts for several days and is followed by secondary fever sometimes more severe than the preceding stage, but generally milder. This could not be considered a relapse, for generally it seemed one of the natural occurrences, a part and portion of the history of the first attack, whose termination appeared to approach indifferently either by some "crisis," or natural evacuation, or else by some gradual, slow and regular subsidence of the febrile action.

But more conclusive than any of the above symptoms as to the perfect identity of these differently manifested conditions are the *post-mortem* appearances. Autopsies were held in most of the fatal cases, and the lesions in every case diagnosed as typhoid fever were identical and perfectly satisfactory as confirmation of our diagnosis. The following are the principal and most constant lesions that I have noticed—(and here let me state that the *post-mortem* examinations in these cases were directed principally to the condition of the small intestine and cæcum and the presence or absence of lesions usually recognized as typhoid. In quite a number of cases, however, the whole intestinal tube was examined and all the abdominal viscera.) In the ileum: In every case that was examined Peyer's patches presented enlargement and ulceration, generally extending for several feet up the intestine. In only two or three instances was the disease so little advanced as to present nothing more than the shaven-beard appearance; but generally the glands were ulcerated, sometimes only enlarged so as to remind me forcibly of the appearance of "wheals" upon the skin, and in one instance so large as to project over one-third of an inch into the cavity of the intestine. The solitary glands presented similar appearances, being enlarged to the size of a split-pea and many of them ulcerated. Both the solitary and Peyer's glands contained the typhoid matter in the shape of a blackish granular deposit. Sometimes the whole mucous membrane of the ileum seemed covered with a similar adherent material, and at other times it seemed as if the matter were deposited beneath the mucous membrane in great black blotches. In some instances the walls of the intestine were congested both externally and internally between the ulcerated and enlarged patches. The greatest extent of pathological change was found towards the cæcal end of the ileum, gradually diminishing in the upper part of the gut and extending to a greater or less extent in different cases; but in every instance was found enlargement and ulceration of both Peyer's and the solitary glands and typhoid deposit. The upper end of the colon presented similar appearances. The ileo-cæcal valve was often thickened and black. The mesentery and mesenteric glands were generally much congested, the latter enlarged to the size of acorns, and blackish-red from engorgement with venous blood. The omentum often presented an appearance as if it had been for a long time macerated. Sometimes the small intestine was nearly empty and packed down in some corner,—occasionally bound down by inflammatory adhesions; at other times it was much distended with gas. Where perforation had occurred redness and peritoneal effusion were generally present. Nothing pathognomonic was observed in the other viscera; the liver, pancreas and kidneys seemed healthy although sometimes slightly softened; the spleen was generally much congested, enlarged and softened; the stomach occasionally congested and its mucous membrane softened, sometimes over the whole organ.

A few words are needful regarding complications. Bronchitis, pneumonia and inflammation and abscess of the parotid were the principal. In no case was any antiphlogistic treatment directed against the intercurrent inflammation more than blistering, expectorants, dry cups and, distrustfully, tartar-emetic. The treatment adopted in all these cases was stimulating and supporting from the outset. Carbonate of ammonia, wine whey, milk-punch

and essence of beef formed our chief reliance, administered in greater or less quantities according to the prostration of the patient; the pulse was our principal guide to quantity. The regulation of the bowels was generally attempted by opiates and astringents; I have found opium a very reliable remedy not only for this purpose but for calming nervous excitement, relieving jactitation and delirium and producing sleep,—its combination with tartar-emetic in the most violent cases of nervous excitement was sometimes followed by the happiest effects. Quinine was used in many instances, but with little if any benefit. Blisters and other derivative applications to the surface were freely used for the relief of the many distressing abdominal symptoms, sometimes with, sometimes without, success. Emulsion of turpentine was also employed, and in a small proportion of cases with benefit. Hoffmann's anodyne was, next to opium, the best anti-spasmodic. But after all our main object was to support the patient, not to break up the disease, for which latter purpose no medicine was of any avail.

Typhoid fever in this hospital has shown no sign of contagion. Two of my medical officers, as also two medical cadets, were affected during the epidemic with slight symptoms of temporary derangement.

I shall not attempt to discuss the cause of the disease. The change of life from home to camp, and exposure to fatigue and wet under new auspices, seem to have developed it. The season has been a remarkably wet one, but as far as I have been able to ascertain not an unhealthy one among the residents of this vicinity. No epidemics have prevailed save the cases of typhoid fever; and the cases of disease outside of military camps and hospitals have been substantially the same as those occurring in our own experience. The regiments from which our sick were derived have generally been actively employed erecting fortifications, laboring in the trenches, felling trees and standing guard,—not as much exposed to fatigue or inclemency of weather as our troops have ordinarily been on frontier service,—and generally provided with good water and the best of food. Their clothing has been suitable to the season of the year and the men themselves have, as a rule, been clean and temperate.

Surgeon C. J. WALTON, *21st Ky., March* 31, 1862, *Green River, Taylor County, Ky.*—But the disease from which our troops suffered most was typhoid fever. This is not to be wondered at when we take into consideration their situation with the circumstances attending them. Almost every possible predisposing cause was in operation at the same time: Badly prepared food; sleeping upon the damp ground; unusually warm and wet weather for the season with sudden changes in the temperature of the atmosphere; want of personal cleanliness; camped in the bend of the river and almost surrounded by it; standing guard during rainy nights; leading inactive lives, not drilling one day in seven on account of mud and rain, and, in a word, almost everything that tends to lower the vital energies. We called it typhoid fever, for we could not, as it appeared in our regiment, term it anything else. There seemed to be no essential difference between it and the ordinary typhoid of private practice except that the symptoms were greatly aggravated. Some practitioners whom I have met do not consider it typhoid but camp fever. They contend that it is a disease peculiar to camp life; but I am unable to trace any distinction except as above stated, in the aggravation of the symptoms. Those who were taken down had generally some premonitory symptoms: Diarrhœa, dull headache, pains in the bones, some soreness of the flesh, lassitude, general debility and loss of appetite. After taking to bed many manifested the greatest indifference to their condition, resting quietly and asking for nothing; when enquiry was made how they felt, they would answer *very well*, or *I feel better to-day;* a few, however, became conscious of their danger. Some were delirious from the beginning,—furiously mad, and constantly attempting to get up and leave their tents; others became delirious after a few days. In these cases typho-mania and coma vigil were common symptoms. Hemorrhage from the bowels occurred in two cases. A few cases had no diarrhœa and ran their course to a favorable termination without any alarming symptom and with but little treatment. There was in a large proportion of the cases a very sluggish state of the circulation,—the hands, feet and face presenting a purple-livid appearance which disappeared temporarily on pressure,—a condition which I have seldom seen to any considerable extent in private practice. I attribute it to the greater degree of constitutional depression arising from the peculiar circumstances under which our troops were placed. Our treatment was altogether expectant. After the disease was fully developed we gave nothing but that which seemed plainly indicated. We generally began with a few doses of quinine and opium; but these were discontinued after the disease was fully developed. I am not able to give a favorable opinion of the use of quinine in typhoid fever, although I have, both in private practice and in the army, given it a fair trial. It is often at first impossible to determine to what extent the case is influenced by malaria, and, consequently, to be on the safe side, it is well when doubt is entertained to begin with a few doses of quinine,—if remittent the case will be controlled, but if typhoid, my opinion is that no good will be effected. Acting on the view that it is a self-limited disease I do not attempt its arrest, but endeavor to enable the patient to live through its usual period of eighteen or twenty days. Hence our treatment was opium, tannin and acetate of lead for the diarrhœa, and stimulants with nutritious diet and scrupulous personal cleanliness for the general condition. Every case was well washed at the onset with tepid water and soap. When the fever was at its height the patient was sponged with cold water, which exercised a very salutary effect. Brandy was administered freely from the beginning. In a word, everything calculated to husband the resources of the system was employed. The patients were fed regularly whether they wanted to eat or not. Nitrate of potash was given in solution with some benefit. After all, I think that opium and brandy are the sheet-anchors. The bowels must be controlled and the patient stimulated; I consider him safe when the bowels are properly checked. I feel no uneasiness if they are not moved for three or four days; I have never seen any bad consequences follow their being checked suddenly. I have used turpentine in a few cases in which diarrhœa was obstinate; but this is more applicable to cases that are troubled with tympanites. I gave twenty drops every two hours, apparently with good results, for two or three days; but every case that had tympanites died. In one case tympanites disappeared for two or three days and reappeared before death. In a few cases I gave minute doses of calomel, but they did no good,—I think harm. We had no hospital and had to treat our men in quarters during the first six weeks. After this we had good hospital shelters and nearly all our cases did remarkably well except those that had been on hand for a considerable time.

Surgeon M. R. GAGE, *25th Wis., Columbus, Ky., March* 31, 1863.—Typhoid fever is very insidious in its approach. Many days or even weeks sometimes elapse, during which the patient feels not well nor yet sufficiently ill to give up or take to bed; he will be found more or less complaining, his aspect dull, stupid and anxious. On the occurrence of delirium he is either animated or lost in apathetic bewilderment. Often diarrhœa comes on early, accompanied with pain, tenderness and hardness of the abdomen, which sometimes becomes tympanitic. Usually as the disease progresses the diarrhœa keeps pace with it, and is, no doubt, the result of intestinal irritation, inflammation and ulceration. Epistaxis is frequently present and sometimes troublesome; at first it seems to give relief to the feeling of oppression about the head, but if continued is quite likely to become a source of debility, and needs watching lest, before we are aware, the patient be found succumbing to its depressing influence. Sometimes we observe upon the chest and abdomen the scattered eruption said to be characteristic of typhoid fever.

Surgeon JAS. V. KENDALL, *on the fevers in the camp of the* 149*th N. Y., in the winter of* 1863.—A large number of the cases at the camp at Aquia Creek commenced gradually, the patient scarcely recognizing that he was sick; slight derangement of the bowels; tongue nearly natural; eyes dull or yellow; urine in about one-half the cases nearly natural at first, though many had paid no attention to this; loss of appetite; slight rigor, after which there would be an aggravation of all the symptoms: Prostration great; urine high-colored and in some cases turbid; diarrhœa increased unless checked by anodynes or astringents; tongue red, afterwards dry; some tenderness of bowels and tympanites. Usually there has been no great difficulty in restraining the discharges, which in many cases were liquid and yellowish and in a few cases bloody; tenesmus was present, but seldom. In two there were large inflammatory swellings under the angle of the right jaw; these suppurated and required incision; one proved fatal and the other will probably terminate in the same manner. Three cases, after having been sick for three weeks, complained of severe pain and tenderness of the feet; in two of these the feet began to swell and became purple, as if sphacelation was threatening. By the use of warm applications the pain and swelling diminished and the feet are now but little discolored. But the worst cases have been taken down with much more violence, without derangement of the bowels: Perhaps the first report the surgeon would have of them would be that they were crazy in their tents. It is probable that they had been taken with a sudden congestion; but the fact could not be definitely ascertained. These cases ran their course rapidly to a fatal termination or to convalescence. Some continued wild till near the fatal ending and then became moderately comatose; these appeared like typhus cases, showing early vibices, sordes and a general implication of the nervous system, manifested by involuntary stools and micturition, but without any troublesome diarrhœa. In one case, that of Captain Wheeler, Company D, the patient came in from duty and was suddenly taken with spasms, becoming stupid and remaining so for several days. Gradually his intelligence returned, the febrile symptoms diminished, the urine, which had been thick with sediment, became clear; he had some appetite; his bowels were costive, but easily moved by aperients; in two weeks he was able to undertake the journey to Washington, and has since gone to his home at Syracuse.

Surgeon W. W. GRANGER, *Post hospital, Houston, Mo., Dec.* 31, 1862.—On the character, course or treatment of fevers as developed in this portion of the army I have nothing to add to my report of September 30 except in relation to typhoid fever, of which only a case or two had then fallen into my hands. The largely increased proportion of cases during the last quarter calls for an outline of the symptoms and treatment. The small, frequent pulse, dry skin, continuous but rarely intense pyrexia, narrow-pointed, dry, red-edged and glossy or cracked tongue, sometimes heavily at others slightly furred with shades varying from grayish-white to yellowish-brown or *rhubarb-colored* and even darker, with the sordes-coated teeth, are symptoms too constant to be overlooked. Those which point to the cerebral and epigastric regions are less constant in their occurrence as well as more variable in their character. Great and persisting wakefulness in some cases, which no prudent amount of opiate seems to overcome, is a frequent but by no means regular symptom. An equally unyielding lethargy prevails with as many more. Delirium and perfect clearness of intellect are equally distributed, whether among the comatose or the wakeful, and no greater fatality seems to attend one class of cerebral symptoms than the other. Nausea and emesis are occasional but not frequent symptoms. Tenderness on epigastric pressure is a frequent but by no means certain occurrence, and while some of the patients have diarrhœa in the course of the disease, as large a proportion, from first to last, require purgatives to procure alvine discharges every forty-eight hours, and not a few have regular evacuations throughout. The treatment has been in all cases tonic from the start, with terebinthinate, vinous or, in the absence of the latter, dilute alcoholic stimulants in the low stages, close attention to incidental or transient symptoms and a bland and easily digested diet. Anodynes (opiate when not contraindicated by cerebral symptoms) and diaphoretics have been employed as occasion demanded. Tepid and cold sponging have proved most efficient in soothing the disturbed brain and restoring healthy action to the skin. Mercurials I have rarely had occasion to use in this disease, but in one or two instances decided benefit followed the use of calomel and chalk in small doses for the purpose of exciting the secretions, especially the salivary. In no case has it been necessary to push the remedy to ptyalism or even to fetor of the breath. Quinine, turpentine and wine, cold or tepid sponging and cleanliness of person, bed and clothing, with well ventilated wards, have proved so reliable as curative agents that I have not yet lost a case of this disease.

Ass't Surg. CHARLES E. CADY, *138th Pa., Relay House, Md., Oct.* 31, 1862.—Many of our cases of typhoid fever were of a highly aggravated character. The invasion was frequently most rapid and prostrating. In several cases the men performed duty on the day before reporting themselves ill, and on the third or fourth day all the pathognomonic symptoms would be unmistakably present. Our mortality has been as low as is usual in private practice. The treatment adopted was that in use in the Pennsylvania hospital, Philadelphia: Good, full and easily digested diet; milk and brandy in punch; eggs; Dover's powder, castor oil, sinapisms, neutral mixture, etc.

Surgeon J. T. CALHOUN, *74th N. Y., Dec.* 31, 1861.—One of the patients while convalescing from typhoid fever

very imprudently ate a quantity of peanuts and jelly: a fatal relapse ensued. This was the first death from disease that occurred in the regiment.

Surgeon J. B. POTTER, *30th Ohio, Fayetteville, April* 2, 1862.—Our typhoid is not the disease so recognized by medical men in private practice, but a continued fever of a typhoid type, modified by change of habits and to a certain extent by climate. Many cases when first reported are delirious, with cold extremities, congestion of the superficial capillaries, free perspirations, rapid and feeble pulse, 120 to 160, and profuse watery diarrhœa. These terminate fatally in forty-eight to seventy-two hours. Such cases require quinia, carbonate of ammonia, brandy, etc., from the commencement.

Surgeon B. ROHRER, *10th Pa. Reserves, Camp Pierpont, Va., December*, 1861.—We have had much less disease of malarial origin than was anticipated from our near location to the Potomac. Citizens long resident here say that they have had less ague in their families this season than for many years, and attribute the favorable change to the frequent heavy rains which flooded the streams and thereby removed the cause. Intermittents, with few exceptions, have been of the quotidian type and readily yielded to quinine; recurrences have been infrequent. Remittents have been somewhat peculiar in their character: Many have shown symptoms which are generally considered pathognomonic of enteric fever, such as rose-colored spots and sudamina, and in consequence have been recorded as typhoid by several surgeons of adjoining regiments. I have been occupying the same apartment with the sick, giving them my whole attention, observing them closely both day and night, and have come to the conclusion that the fever is of malarial origin and of the bilious or remittent type. The grounds for this belief are: 1st. Absence of epistaxis, hemorrhage, obstinate diarrhœa, tympanites, deafness and stupor or delirium after the fifth day, the delirium being invariably an early symptom. 2d. The early convalescence of all and no new cases occurring after one or two heavy frosts. Nearly all when brought to the hospital were delirious, that being the first symptom to attract the attention of their messmates, who thought them either drunk or crazy. In conversation they seemed rational enough, but when left to themselves they would give way to incoherent expressions or endeavor to make their escape. Several succeeded by stratagem in getting out of the hospital and ran to the quarters, half a mile distant, at night with bare feet over the frozen ground. The patients complained of being chilly, although their surface was warm to the touch and they were well covered and surrounded with bottles of hot water; the pulse varied from 100 to 120, the tongue was slightly coated and there was great thirst. This condition lasted from six to thirty hours. The cerebral disturbance in some instances continued two or three days, and as it abated and the patients became more rational they complained of pain in the head, tenderness upon pressure in the epigastrium and general aching and soreness. The skin was hot and dry; there was a tendency to diarrhœa, no matter how mild the purgative, and the evacuations were dark, at times almost black. After the third or fourth day the pulse became less frequent and the tongue dry, smooth, glossy and red or cracked; the tenderness over the epigastrium was aggravated, the urine scanty and high-colored and the eyes slightly tinged with yellow. From the sixth to the ninth day the rose-colored eruption and sudamina made their appearance, also a dry bronchial cough, and by the twelfth or fifteenth day, with one exception, they were sufficiently convalescent to move about the room. If delirious when brought into the hospital wet cups were applied to the back of the neck, and if these afforded no relief a blister was applied over the same place. A purgative of calomel was followed by castor oil, and in the morning from 4 to 10 o'clock, when I could discover a slight remission, from fifteen to forty grains of quinine were administered; during the day, at intervals of four hours, small doses of calomel and ipecacuanha were given. Turpentine was used when the tongue was dry and cracked. Milk diet was employed and barley-water used as a drink.

Surgeon DEWITT C. VAN SLYCK, *35th N. Y., Falls Church, Va., Oct.* 20, 1861.—During the months of August and September more than five hundred cases of fever were treated; the duration of these was from four or five days to as many weeks. The first cases were intermitting in type, with a tendency to enteric disease. The fever soon after took on a remitting form and finally assumed a low typhoid grade, in many cases exceedingly malignant. The treatment consisted of a mild mercurial laxative, generally blue mass followed by large doses of quinine, and occasionally anodynes and sudorifics. From twenty to sixty grains of sulphate of quinine per day were administered, and if these doses did not entirely eradicate the disease within the first week they modified and reduced its malignancy and duration. No other method of treatment was effective. Mixed and complicated cases were treated according to the indications. During the last stage stimulants were given with manifest advantage. In nearly all the malignant cases sudamina and petechiæ covered the abdomen. From the abdominal tenderness and obstinate diarrhœa which these cases exhibited it was evident that the mucous follicles of the intestines were seriously involved; this condition was frequently protracted and greatly retarded convalescence. It is regretted that no opportunity was afforded for *post-mortem* examination in the two cases that proved fatal. Convalescence was slow, and in many cases relapse followed imprudence in diet and exercise.

Surgeon A. P. MAYLERT, U. S. V., *General Field Hospital, Army of the Ohio, before Corinth*, 1862.—The cases of disease treated in this hospital were very similar in character, yet were such as could scarcely be correctly named by any term in nosology. The patient was usually much emaciated, the skin of a light waxen or rather clay color; the pulse small, compressible, variable in character and quickened under the least exertion; the tongue thin and broad, moist, and, with the fauces, almost natural in color, or perhaps of a darker tint than in health: in many the gums were spongy and bled readily upon pressure. The skin was generally moist; there was seldom much fever. The appetite was somewhat capricious—usually no desire for food was manifested, but when fresh vegetables or fresh beef, suitably cooked, were offered they were evidently relished except in the graver cases. The alvine evacuations were more frequent than natural, thin, but otherwise healthy in appearance, except, perhaps, somewhat darker, and in some cases slightly tinged with blood; they were not often attended with pain. There was rarely tympanites, and usually but little tenderness on pressure. In many cases one or both parotid glands were extensively inflamed;

this occurred in the later stages of the disease and terminated occasionally in suppuration. Probably one-half of these were fatal. I know of nothing, in the cases which recovered, to distinguish them from those which terminated fatally except that perhaps in the former suppuration was earlier established. The functions of the brain and nervous system were often considerably impaired: In all cases the patient was languid, weak and disposed to be quiet and sleep as much as possible: there was almost total want of judgment, the memory was defective and the mind wandering: the delirium was always mild in character. In short, this disease was termed variously remittent fever, typhoid fever, diarrhœa, dysentery or scorbutus, according to the symptoms. In each case was a dyscrasia resulting clearly, as I apprehend, from exposure and lack of suitable nourishment. *Post-mortem* examination usually showed a congested condition of the small intestine, seldom amounting to decided inflammation and rarely attended with ulceration. There was generally a dirty dark-red appearance of the mucous membrane, which was somewhat softened, being readily removed by rubbing with the back of the scalpel. Invaginations of the small intestine were frequently found but were never strangulated. The gall-bladder was often distended with bile. The ventricles of the brain and the pericardial sac contained a little more serum than natural. Frequently a fibrinous clot was found in one or both ventricles of the heart, and sometimes this was so large as to distend the heart or at least keep it of normal size. No other abnormal appearances were constant except general emaciation and a flabby and atrophied condition of the muscular system. In many cases the blood appeared thin and uncoagulable in both arteries and veins. A few cases of sudden death showed a degree of pulmonary congestion, or even pulmonary apoplexy, evidently induced by heat exhaustion in patients already greatly reduced by blood-poisoning. The treatment consisted mainly in careful nursing with nourishing diet, where it could be given, and stimulants combined in some cases with quinia.

Surgeon J. B. JACKSON. *121st U. S. Colored Infantry, Maysville, Ky., February*, 1865.—Edward Gray, Taylor Phillips and Robert Nelson were brought to hospital about the same time in a state of collapse, with cold extremities, slow and weak pulse, a vacant stare and mental hallucinations; subsultus tendinum was present, especially on attempting to move. They loathed food and presented a scorbutic appearance. There seemed to be an engorgement of the whole system, particularly of the liver. They would not acknowledge themselves sick, and came to hospital by order of the surgeon of the regiment, who said he considered them nearly dead. Hepatic agents, counter-irritants, stimulants, tonics and anti-scorbutics were employed, without manifest effect except that in Taylor's case heavy bilious stools were procured: but there was no response on the part of the nervous or circulatory system. The patients, if allowed, would rise and walk almost to the hour of their death.* Gray died on the second day after entering hospital and Phillips on the fourth; Nelson lived seven days longer. Diarrhœa set in about the sixth day, the most simple diet passing unchanged: injections were tried but none were retained. He continued with little change of mind or body, except emaciation, until death.

These men had been in camp about three weeks. They came from the rural districts and had been accustomed to fresh air and much diet. When they joined the weather was intensely cold at night. They were shut up in their tents filled with coal-dust and smoke, and of course lived on the soldier's ration. They suffered severely; subsequently they were removed to a large building, well lighted but with a low ceiling and only one stove. The increased cold weather made it necessary to position of a room about 25 by 30 feet, where for about ten days fifty or sixty men were crowded together day and night. During this state of things these three cases were developed, and all cases of measles, fever, diarrhœa, etc., from that company assumed a malignant type and inclined to typhoid or scorbutic. The commanding officer was made aware of this, and as soon as possible had his quarters expanded, drilled his men every day in the open air and furnished them with plenty of mixed diet. In little over two weeks all diseases became more amenable to treatment.

Extract from the records of the Chimborazo Hospital, Richmond, Va.—The typhoid fevers observed during the winter 1863-4 have been generally prolonged, but less so as spring approached. There has been almost uniformly a loose state of the bowels, the characteristic thin stools, but less offensive than is usual when turpentine and chlorate of potash, which are the routine here, are not employed. Few have exhibited much abdominal tenderness,

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* Surgeon BATWELL, Surgeon 14th Mich. Vet. Inf., in an account of a fever that prevailed at Camp Big Springs, Miss., in June, 1862, published in The Amer. Med. and Surg. Reporter, Phila., 1865, p. 364 *et seq.*, reports that after the evacuation of Corinth, and during the movement of the pursuing army to Jacksville, intense heat succeeded to a copious rainfall, during which the soldiers were exposed without tents or sufficient clothing, having left their baggage in the camps at Farmington. As there was a dearth of pure water, the stagnant contents of pools were drunk by men and animals, the sulphuretted water of the artesian wells being used only in urgent necessity. At this time chills and fever appeared among the troops, the febrile action finally becoming continued and of a low type. After falling back to Big Springs an anomalous fever invaded the army. It commenced with malaise: the skin was cool, the tongue moist and natural, the pulse never above 90 and the urinary and alvine secretions regular. There was no fever, nothing to indicate anything wrong: the appetite, if anything, was increased; no want of sleep was complained of, nor did a single symptom present itself indicative of diseased action. Despite all this there was a look about your patient, an expression of countenance that [illegible] There was an irresistible propensity to walk about; nothing but force could keep the patient from leaving his bed, and this [illegible] marked as the case approached a fatal termination. From the commencement of the complaint there was a rapid loss of flesh and [illegible] weak and feeble. Restlessness lasted from about the twelfth to the twentieth day, after which there was less disposition to begin [illegible] but would move over a greater distance. After one of these walks he would express himself as feeling better, go to bed and die in a [illegible] Batwell narrated eighteen of these fatal cases in the regiment, all varying but little in their symptoms. The mortality was also great in other [illegible] dying on their way to general hospital. The disease was called typhoid fever by army surgeons, but BATWELL says that he [illegible] point of similarity of the symptoms." A local practitioner of whom he made inquiries described the disease accurately, calling it [illegible] saying "it was peculiar to that section of Mississippi, and that change of location alone exercised any influence over it; that [illegible] were especially attacked, and it generally proved fatal." Little benefit was derived from treatment, which, from the absence of anything [illegible]

some none at all. Sub-delirium has been frequent; violent delirium has never occurred. Maculæ have been absent. The gastric type has been rare; few have complained of irritation induced by turpentine, which is given in emulsion in ten-drop doses. Neither cupping nor purging has been employed. In some cases calomel, ipecacuanha and opium have been given, seldom with appreciable benefit. The stimulant method, with whiskey or brandy toddy, egg-nog and animal broths has been employed from the first in nearly all cases, and continued to convalescence. The intervals between the evening and morning meals have been too long for some patients, and it is to be noted that no soups or food other than dry bread is usually kept over night in the wards. It is desirable that attention should be directed to this point and that the intervals of nourishment as well as of stimulation should be distinctly described. Bronchial irritation has been common as a complication and pneumonia not rare. The hospital pharmacy is deficient or has been so in pectoral remedies. Cough mixture often lacked some of its intended elements and afforded but slight palliation. The balsam tar-water, sanguinaria and asclepias tuberosa would form important additions to the pectoral budget. Some cases presented, without violent delirium, the most intense irritation of the nervous centres—continual twitching of features, muscles, etc., and working out of bed and throwing off the bedclothes. The resources of the hospital in the way of antispasmodics are deplorably limited.

Remarks on the Sequelæ of Chickahominy Fever, Act. Ass't Surg. J. M. Da Costa, *U. S. A., Dec.* 31, 1862.—Among the soldiers returning from the Peninsular campaign a form of fever was observed marked by features of uncommon character. It is not my purpose to attempt a description of this malady, but rather to speak of the morbid states met with after the fever proper has left, and which may therefore be regarded as its consequences or sequelæ; nor can I say that my delineation will include all the possible results of this grave disease. Others may have encountered other issues. I can do no more than sketch what I have seen and endeavor to reproduce those outlines which I believe to be most significant, and which have become familiar to me from personal observation; and first of the—

General appearance.—A striking sign left by the fever is great emaciation. The patient rises from his sick bed the shadow of his former self. In some cases the loss of flesh is so excessive that the muscles of the body appear literally to have been absorbed. The hair falls out in quantities and the whole appearance is that of a person hopelessly reduced; yet, unless diarrhœa be present, the flesh is, under generous diet, rapidly regained. Nay, I have seen individuals soon acquire more than they had lost by the attack of fever. The countenance, produced in part by emaciation and in part by a peculiar hue, is strongly characteristic. No disease has a more remarkable physiognomy. The eye is not heavy nor remarkably languid; the conjunctiva is clear or injected, never yellowish, thus forming a marked contrast with the pallid and yellowish color of the face. The peculiar look may last for a month.

Debility.—Both body and mind remain for a considerable period enfeebled. The weakness of the former shows itself in an inability to bear exercise or undergo fatigue of any kind, whilst the debilitated state of the latter is plainly seen in the loss of memory so constantly complained of. The exhaustion of strength is at times so great that the patient who for a week or two has been able to leave his bed is found to be again losing ground and lapses into a typhoid state in which he perishes:

P. Purcell, 49th N. Y.; age 45; was admitted August 7 from Harrison's Landing. He was just recovering from the fever and was much exhausted by his journey from the James River. After a few days careful nursing he rallied and was soon able to walk about. He continued to gain slowly until the 20th, yet was easily fatigued, and, though craving alcoholic stimulants, was unwilling to eat much. From this time, without any assignable cause, he lost strength daily, and by the 30th was confined to bed. All appetite was gone and it was with the greatest difficulty that he could be persuaded to take any nourishment whatever. He commenced to vomit green matter; his eyes were injected, pulse feeble and skin cool. His stools were at times liquid, at times natural and not of unusual frequency. On September 4 the irritability of the stomach had to a great degree subsided; but a violent diarrhœa set in attended with severe pain and uncontrolled by opiates and astringents. On the 8th he died in a state of utter exhaustion, yet retaining his senses almost to the last. *Post-mortem* examination: Extreme emaciation. Both lungs with old pleuritic adhesions, but the organs themselves healthy. Heart flabby; right ventricle contained a small clot. Spleen lake-red in section. Liver somewhat enlarged and fatty. Stomach and intestines distended with air. Inflammation in patches in the ileum; its glands healthy. Inflammation of cæcum and sigmoid flexure, a less degree in rectum and a feeble degree in ascending and descending colon; there were also a number of small ulcers about the size of a pea in the sigmoid flexure and rectum. Solitary glands with black deposit but otherwise healthy. Kidneys normal.

In looking over the history of this case the question suggests itself, was not this rather a relapse of the original malady? The absence of fever, of cerebral disturbance and the *post-mortem* evidence seem to disprove such an idea. The man's death was, I think, produced by progressive exhaustion, and hastened by an attack of colitis which his enfeebled frame was unable to withstand. In one other case the same result took place, except that there was little or no preceding diarrhœa. Another case recovered, the irritability of the stomach yielding to mercurial purges and repeated doses of dilute sulphuric acid.

Changes in the blood.—In a large number of cases the blood is profoundly altered. The clinical evidence of this is found in the pale look of the tongue, the pallid face, the blood murmurs and the spots that appear on the skin. These spots are like those of purpura; they do not disappear on pressure. Sometimes they are isolated, at others confluent, giving a purple or dark-bluish look to large patches of skin. In the following case this appearance was very marked:

Thomas Rose, 49th Pa.; age 20; was attacked with diarrhœa while on duty on the Chickahominy. This, after the lapse of a month, was followed by fever attended with great prostration and mental wandering. In this condition he came under my care on August 7. He was stimulated and carefully nourished, and by the 14th the fever had subsided, the diarrhœa remaining. This was treated with pills consisting of the sulphates of morphia

and iron, for which, on the 27th, tannic acid was substituted with the happiest effects. From September 1 looseness of the bowels ceased to be a prominent symptom. About this time dark-bluish spots were noticed on his chest, unchanged by pressure and of varying size. Soon afterwards they made their appearance on the abdomen and then on the extremities. On the trunk places of a foot in diameter could be found on which no healthy skin could be seen, nothing but dark spots on a variously tinted purple back ground. The gums were firm and healthy-looking, the tongue clean, the abdomen flat, certainly not distended, the skin cool, pulse feeble and 102 per minute. There was very great emaciation and debility and occasionally sore throat; the voice was husky and rarely raised above a whisper. The bowels were on the whole regular, one or two watery passages occurring daily. The patient remained much in this condition until his death, neither the mineral acids, the salts of iron nor a liberal and varied diet checking the spread of the purpurous spots. *Post-mortem* examination: Body considerably emaciated and everywhere ecchymosed. Lungs normal. Heart healthy; a white clot in the right ventricle extending into the pulmonary artery, another in the left auricle and a third in the commencement of the aorta. Spleen, liver, kidneys, suprarenal bodies and pancreas natural. Stomach with inflammation of the mucous membrane more or less diffused, mingled with small patches of greater intensity. Inflammation in patches of the mucous membrane of the ileum, increasing in intensity towards the termination; solitary glands enlarged, inflamed and containing black matter; agminated glands with black deposit but otherwise apparently healthy. Colon distended with air, except descending portion, which was narrowly contracted and not inflamed; cæcum, ascending and transverse colon inflamed; solitary glands conspicuous and containing black matter.

Unfortunately no chemical examination was made of the blood in this case—one of a series, including many lighter ones, which have been confounded with typhus fever. But the difference is palpable in spite of the similarity of the eruption to that of some of the stages of typhus,—there is an utter absence of the high fever, the cerebral symptoms, the physiognomy and the early cutaneous rash which mark that disease.

Cardiac disorders.—The wards of all the hospitals are crowded with men complaining of a disease of the heart. What the nature of it commonly is let the following cases answer:

J. B. Waters, corporal, Co. A, 2d N. Y.; age 24; was admitted August 10 from Harrison's Landing, where he had been sick with fever since July 11. The disease was preceded by dysentery. The febrile symptoms subsided within a week after his admission, but the man remained prostrate and was unable to sit up until the last week in August. During this slow convalescence he suffered much from flatulence and was troubled with palpitation and a feeling of uneasiness in the cardiac region. An examination of the heart showed increased action without increased percussion dulness. The second sound was very distinct; the first was replaced by a soft systolic murmur marked at the base but also extending towards the apex. This state of things continued until December, the blowing sound becoming gradually fainter and only being distinctly heard after exercise. The patient is now, the 12th, in good general health, and does not suffer unless he walks much, when his breathing becomes oppressed; the respirations are still quick, thirty a minute, and he cannot sleep on his left side; an examination of the heart shows the transverse percussion dulness to be three and three-quarter inches, the longitudinal three and a half inches; the impulse remains forcible and is felt in two intercostal spaces; the second sound is very distinct, but the first dull; a slight hum is yet heard in the cervical veins. The treatment comprised the administration of quinine, iron and strychnia, replaced by veratrum viride when the heart's action was violent; the cardiac uneasiness was much relieved by a belladonna plaster worn over the heart. This case is typical. The appearance of the heart trouble after the fever, its long continuance, the systolic blowing sound and its gradual disappearance, the irritable state of the organ remaining long after the general health was in every other respect fully reëstablished, all form a clinical combination of very great interest and frequency. Many such patients are thought to have hypertrophy and valvular disease, but although here and there a case of doubtful diagnosis may occur, it is generally not difficult to distinguish between these cardiac maladies. The previous history, the absence of increased percussion dulness, the temporary duration of the blowing sound are just the opposite from the visibly augmented size of the heart and the permanent murmur of valvular disease. Then, too, the character and site of the murmur are peculiar: It is never rough, always attends the impulse and is very often associated with a hum in the jugular veins. It is plainest at or near midsternum and is thence transmitted in the course of the aorta or pulmonary artery; it is rarely distinct over the apex of the heart. It is frequent, but it would be a mistake to suppose it invariably present in the class of cases just described. Very often the first sound of the heart is dull, short, ill defined and unattended with a murmur; the second sound I have invariably observed to be clear and sharp. In some patients the impulse is very irregular and the cardiac rhythm much changed.

John Bricker, 8th Pa. Cav.; age 24; was taken sick at Fair Oaks Station, June 7, with severe diarrhœa accompanied with excessive griping pains and followed by the discharge of considerable blood. About the 21st he was seized with fever commencing with rigors, pain on the left side of the chest and in the loins. He noticed that any attempt to stand brought on dimness of sight and dizziness, and also that his tongue was very dark, loaded and dry. About the 29th, while the fever still existed, he was moved to Harrison's Landing, then to Fortress Monroe and thence to this hospital, where he arrived July 7. On his arrival he had little or no fever, but the diarrhœa was still bad, from five to six passages daily, not, however, containing blood. He stated that he had expectorated blood once or twice shortly before he was sent here, and that before the attack of fever he had been in good health. Shortly after his admission he had a slight hemorrhage and complained much of pain in his left breast, which he described as constant, of a sharp cutting character, not increased in intensity by any circumstance he noted, and reaching at times from the lower ribs up to the third or fourth. As soon as he commenced to walk about he observed palpitation of the heart; the action of the organ was very irregular and attended with a blowing sound. He improved much under treatment, and now has a very good appetite and enjoys his food. The diarrhœa has

disappeared and he has nearly regained his strength; but any excitement or labor agitates him and brings on violent beating of the heart. Percussion gives him pain; it shows, if performed with care, the transverse diameter to be slightly increased. The apex strikes at its normal position, but the impulse communicated to the finger is every now and then of a throbbing character, extended and intermitting. On auscultation the first sound is dull and a murmur of low pitch is perceived with the systole following the marked intermission; a blowing sound is at the same time heard in the carotid; there is also a continuous hum in the cervical veins. The pulse is about 90, intermitting every third to seventh beat. It is very likely that here the walls of the heart have undergone some change, and that the lack of tone may lead, if it has not already led, to a dilatation of the ventricles. That organic changes may indeed be produced by the unvaried abnormal action I have no doubt. I have seen such cases. One was for months under my observation in the hospital, the signs of dilated hypertrophy developing themselves more and more clearly. If it, then, be possible for organic disease to follow long-continued functional disturbance, the very grave question arises whether men convalescing from fever, with the state of the heart described, are fit for further service. I think not; certainly not when this condition of the organ outlasts a marked improvement in the general health. Amendment is slow, and for perfect recovery to take place long rest of body is essential. Active exercise would be the means most likely to lead to organic disease. The medical treatment which I have found best suited to the class of cases under discussion consists in the administration of iron and nux vomica; to this belladonna, both externally and internally, may be added with advantage, especially if there be much pain in the cardiac region. When the heart's action is very violent I have lowered it by veratrum viride, temporarily suspending the tonic medication, or sometimes employing both agents conjointly.

Phlegmasia alba dolens.—Two cases of this strange morbid condition have come under my notice. Both occurred during convalescence from the fever, and in both recovery took place. In the first the tense smooth swelling occupied the whole thigh of the left side, especially the upper and inner part. It was particularly hard in the course of the saphena vein, which seemed enlarged. A blister was applied over the course of the vein and the swollen thigh kept constantly swathed in lead-water and laudanum. The tumefaction subsided very gradually and did not disappear entirely for several months. In the second case there was much pain along the course of the femoral vein and in the calf of the right leg, which was much increased in size for four or five days, sensitive to the touch, œdematous and partially paralyzed. After that it slowly resumed its natural appearance, but the man does not even now walk without lameness.

Inflammation of the parotid gland tending to suppuration is occasionally encountered in this fever. Of four cases that came under my notice three recovered, one proved fatal. In one of those having a favorable termination both glands became seriously affected. Here the disorder appeared before the febrile signs had left. In the following case the inflammation set in after the commencement of convalescence:

Jacob Risley, Co. F, 6th Pa. Cav., was seized with fever and diarrhœa about July 11 at Harrison's Landing. When admitted into this hospital on August 7 he was very prostrate and suffered much from diarrhœa, but had little or no fever. He soon commenced to improve and after a few days was able to sit up. On the 16th a tumor was observed at the angle of the jaw attended with much pain. It soon increased and appeared to involve the whole right side of the face. It was moderately tender on pressure, not accompanied by much external redness and unassociated with any signs of inflammation of the tonsils or throat. An effort was made to produce resolution by painting with iodine, but it did not succeed. An indistinct fluctuation soon showed that suppuration had taken place. The abscess pointed at the angle of the jaw and was opened, discharging a teacupful of offensive matter. The discharge continued six weeks; the cut then healed, but to this day the patient frequently complains of pain in the region of the duct, which can be felt, hard and round, just below the malar bones. Otherwise he is now in perfect health. The diarrhœa yielded, before the discharge ceased, to the use of sulphates of copper, iron and morphia.

Diarrhœa.—This is one of the most frequent and at the same time one of the gravest sequels of the fever. Indeed, hardly a case of Chickahominy fever recovers without great irritability of the bowels remaining for months afterwards, and under unfavorable circumstances this irritability lapses into uncontrollable diarrhœa. The relation the diarrhœa bears to the fever is very close. It generally precedes it, sometimes by weeks, is a prominent symptom throughout its course and outlasts it. It rarely if ever occurs where it has not been present during the fever. In describing its characteristic traits I shall draw rather from a group of cases that I have noted than give the history of any one in particular: The man who is the subject of the disease convalesces from the fever very slowly. He takes but little nourishment, since if he eats much frequent stools are the result; yet he has scarcely any gastric disturbance, does not vomit, does not loathe food; his tongue is moist and clean. The abdomen is distended with gas, the seat of a dull pain but not painful on pressure. If asked what troubles him most, he generally refers to the flatulency, points to the inability to button his clothes, and may often be heard to declare that he is less annoyed when he has many passages than when they are checked, since in their absence he becomes bloated. His features are pale; his eyes clear; he does not bear fatigue well, though on the whole it is often a matter of wonder that the countenance is so healthy-looking and his strength not more impaired than it is. He may remain in this condition for weeks, either slowly gaining or on the other hand slowly losing ground. In the former case he is liable to the diarrhœa, which has been checked, breaking out from time to time; in the latter he becomes much emaciated, and dies utterly worn out after months of suffering. Among the symptoms mentioned the state of the tongue and gums, the stools and the abdominal pains require a more extended notice. The *tongue* is smooth and moist, sometimes very pale, but almost always clean; only in a few cases is it observed to be coated. The *gums* are generally hard; now and then, probably from antecedent scurvy, they are spongy and red, but this condition is not nearly so frequent as the former, nor can I say that I have found where it existed any difference in the other symptoms,—the diarrhœa did not seem to me either to yield more readily or to be more intractable. The *stools* are always thin and remain so long

after they are reduced in frequency. In color they are mostly yellowish, sometimes greenish, rarely dark or very offensive. In not more than one case in fifty do they contain blood. They are frequent, varying from five to twenty or upwards in the twenty-four hours. The passages are not attended with much pain or tenesmus, still there are numerous exceptions to this rule, and then hemorrhoids seem to result from the constant bearing down. *Abdominal pain* is often complained of by the patient. It is, perhaps, a sense of soreness and uneasiness more than of pain, increased from time to time by exacerbations of colic. It is not as a rule augmented by pressure, and this absence of tenderness is very remarkable. When any tender spots exist they are generally discovered in the course of the large intestine. Some few speak of a weighty feeling in the region of the spleen, which organ, on percussion, is found to be increased; yet enlargement of the spleen, contrary to expectation, is not a frequent sequel of the fever. In some cases the urinary organs are deranged: There is a constant disposition to pass water, which becomes a source of great annoyance to the patient. The urine voided is copious and pale, of low specific gravity and contains neither sugar nor albumen. The diagnosis of the diarrhœa is very easy. There is only one complaint with which it may be confounded—dropsy; but careful percussion soon shows that the distention is owing to wind and not to liquid. Dropsy is, indeed, very rarely met with after Chickahominy fever; I have encountered but one instance of the kind, and there it was associated with albumen in the urine. The *post-mortem* appearances are, as far as I have been able to pursue the matter, the same as in the Chickahominy diarrhœa without preceding fever. There is an absence, for the most part, of ulceration or thickening of the mucous membrane, accounting thus for the want of tenderness. There are patches of inflammation near the ileo-cæcal valve, in the colon and sometimes throughout the ileum. The agminated glands are prominent and contain blackish pigment, and so do the solitary glands. The exciting cause of these curious morbid changes is veiled in obscurity. This much, however, appears. There must be in the poison giving rise to the fever something capable at the same time of producing the diarrhœa,—in other words, the same cause may occasion both. The treatment of the diarrhœa consequent upon the fever is the same as that of the diarrhœa without antecedent fever. Both are alike obstinate and difficult to influence. In both all medicines often fail. The best results have in my hands been derived from carefully regulating the diet and administering large doses of tannic acid conjoined with opium, five grains of the former with from one-fourth to one-third of the latter, in pill, four times daily. The medicine can be borne for weeks at a time without nauseating. The subnitrate of bismuth, the sulphate of copper and the nitrate of silver stand next in efficacy, and sometimes succeed where tannic acid fails, The pernitrate of iron, given in from fifteen to thirty-drop doses three times a day, is occasionally of service: but on the whole it has disappointed me. Opium alone does not answer, although useful when joined to other agents. Opium suppositories or enemata give the patient rest at night and are thus of benefit. The tinctures or infusions of catechu and kino only act advantageously in light cases. From acetate of lead, tincture of the chloride of iron, turpentine, the mineral acids, Hope's mixture, quinia, strychnia, saline purgatives and Dover's powder I have seen little or no good effect, although I have given each of them a fair trial. Carminatives exert only a temporary influence on the flatulency. In one case both this troublesome symptom and the diarrhœa yielded to charcoal. Diarrhœa is the last of the issues of Chickahominy fever I shall notice. A few of the less prominent, such as pain in the limbs, the occasional occurrence of tympanites without diarrhœa, I shall merely indicate without specially describing. In taking a survey of the symptoms thus strung together the similarity to those encountered during protracted convalescence from typhoid fever becomes at once apparent, but the dissimilarity is also manifest. Where, for instance, are the pulmonary troubles so common in the latter complaint? Any further discussion is, however, here out of place.

To ascertain whether Chickahominy fever be modified typhoid fever or a distinct disease would require further data and other trains of reasoning than are here admissible. Let, then, this report be accepted as an unbiased clinical contribution to the history of one of the most interesting but unfortunately most destructive forms of fever that this generation of physicians has been called upon to study.

V.—TYPHUS FEVER.

There seems no doubt that occasional cases of typhus fever were treated in the general hospitals during the war, but it is probable that in most of these the disease was due to civic and not to military contagion. We have the high authority of Dr. Austin Flint for two of the cases, 7 and 8,* that have been submitted, in one of which it is explicitly stated that the fever was contracted while the soldier was at his home in New York City. Cases 5 and 6, treated at the same time in the Cuyler hospital, Philadelphia, Pa., the subject in one instance being a contract nurse, and in the other a patient who had been in hospital for nearly three months with a rheumatic affection, appear also to have been true typhus; and in this connection 389 of the *post-mortem* series may be referred to, as presented by the records of the same hospital, showing restless delirium alternating with comatose quiet, suppression of urine, petechiæ and death on the fourth day with no abnormal condition of the intestines. Case 1, which occurred in a patient recovering from gunshot injury in the hospital at Annapolis, Md., was probably typhus, as the clinical record is supported by the

* Supra, p. 290.

possibility of contact with true typhus then recognized as present in one of the wards. Case 9, in the Lexington avenue hospital, New York City, may also have been typhus, but in 10, from the records of the same hospital, the evidence is insufficient to show that the soldier contracted this fever at Sandy Hook, Md., or in camp prior to the date of his shipment from that point.

In fact the records do not furnish a single instance of undoubted typhus as having occurred among our troops in the field. In cases 12 and 13 there is nothing to substantiate the diagnosis. In 11 the disappearance of the eruption under pressure, the diarrhœa, tympanites, epistaxis and bronchitis suggest typhoid rather than typhus fever. In 3 and 4, both received about the same time from the 119th Ill. regiment at Quincy, Ill., the presumption is in favor of typhoid; in the former a recrudescence is recorded, with death from the gravity of the intestinal lesions, hastened by exhaustion from copious hemorrhages; in the latter a history of typhoid with violent cerebral symptoms, diarrhœa at first but not in the later stages, perspirations, red spots on the body and face on the sixteenth day, and death on the twenty-second. In 2, which may have been typhus, the patient was a hospital inmate convalescing from measles; his face was suffused and spotted, and death occurred on the thirteenth day, but the other symptoms were such as were frequently found in doubtful typhoid cases.

Moreover, the experience of other armies shows definitely that if the contagion of typhus had gained access to our camps, no search of the records of individual cases would have been required to substantiate the fact. The death-roll of our medical officers and hospital nurses would have been a sufficient demonstration.*

Undoubtedly there occurred in our camps a number of febrile cases presenting duskiness of skin, intense cerebral symptoms, dark-colored spots and petechiæ on the chest, abdomen and even on the face, unaccompanied with well defined symptoms of an enteric lesion. It is not surprising that such cases were regarded as typhus by some of our medical officers, for in an epidemic of typhus fever they would certainly have been ascribed to the epidemic cause, and even occurring as they did in isolated cases, their generally rapid and fatal course was sufficiently striking to warrant those who saw them for the first time in fearing that they had before them something dangerously different from the familiar typhoid. But as a larger experience demonstrated the comparative non-contagiousness of these cases, and *post-mortem* examination showed in them the characteristic lesions of typhoid, they became less

* See, for instance, Félix Jacquot—*Du Typhus de l'Armée d'Orient*, Paris, 1858, p. 56 *et seq.*—The two typhus epidemics in the Crimea began with the first hard frosts of December, 1854, and December, 1855. Originating in both years in the Crimea, the disease showed itself in the distant hospitals one month after its outbreak among the troops in the field. These hospitals became in their turn active foci whence the fever was propagated by contagion, and where probably, according to M. Jacquot, it also originated in some instances, in view of the concourse of so many individuals reduced by exhaustion and privation and affected by scurvy and other diseases. The English troops were the first to become infected, but in a little time the French army commenced likewise to suffer. The condition of the latter, though relatively better than that of the English, who became engaged in a great continental war without being prepared for it, was nevertheless far from satisfactory. The Russians, according to Drs. Mœring and Alferief, were tainted with typhus even before the allied armies showed any sign of it. The Russian and Turkish troops in Asia equally fell a prey to it. In a word, typhus was developed wherever were found aggregations of men exposed to fatigue and anxieties, badly quartered, poorly clad, and whose nourishment was not of such a nature as to counteract these hygienic drawbacks. About a month after its development in the Crimea it broke out in all the French hospitals in Constantinople, as also in the English hospital at Scutari. * * * In December, 1855, the English, who in the meantime had completely modified their system and reformed their administration, who were better located and quartered, better clothed and fed, less fatigued and exempt from scurvy, which prevailed fearfully in the French army, escaped visitation from typhus, while the latter suffered from it to a far greater extent than in the previous year. The Italians were a little less affected than the French. In January, 1856, typhus was imported into Constantinople; but the English hospital at Scutari escaped, as did their troops in the Crimea. All the French hospitals were invaded, those situated on the plateau extending from Ramis-Chiflick to Daoud-Pacha and the Candilié hospital on the Bosphorus. There were, including extemporized establishments, twenty hospitals in and around Constantinople, and not one of them escaped. The disease appeared also in the hospitals at Gallipolis and Nagara on the Dardanelles. The crews of merchant and government vessels engaged in the transport of sick and wounded were decimated. Typhus was introduced into the hospitals at Marseilles, Toulon, Porquerolles, Frioul, Avignon and into the Val-de-Grâce in Paris; and isolated cases died in many localities, as at Chalon-sur-Saône, Neufchateau, etc. Fortunately, in Constantinople as well as in France, the disease did not spread outside of the hospitals; but in besieged cities or overcrowded places where troops were quartered in barracks side by side with the population, as for instance in the village of Tchistinakaia near Simféropol, the civil population was more or less affected. In Russia it passed from the Crimea to Odessa, Nicolaïeff and several other localities; Varna, occupied by the French, was likewise affected, and finally the Turkish and Russian armies in Asia Minor paid a heavy tribute to this fever.

frequently reported as typhus. The clinical features of idiopathic febrile affections are not circumscribed but confluent. It has already been shown in this volume that it was not possible in all cases to determine from the symptoms alone that a fever was malarial or typhoid. So in cotemporaneous epidemics of typhus and typhoid, it is not possible in all cases for the clinician to distinguish between them.* Even in typhoid epidemics the practitioner is sometimes at first uncertain in his diagnosis.† The disease in its onset seizing those who have the strongest predisposition, may run a quickly fatal course in individual cases, leaving to future cases or *post-mortem* inquiries the determination of the specific form of fever. The first case may be considered typhus, but when the typhoid nature of the epidemic has been established, other such cases occurring thereafter receive a proper recognition. Again, in malarious districts fulminant febrile cases with cerebral symptoms terminating speedily in death by coma and attended with cutaneous hemorrhagic blotches were, when first seen, regarded doubtfully as typhus, cerebro-spinal meningitis or congestive malarial fevers, until a larger experience showed their etiological relations with malaria rather than with other specific causes of disease. Thus are explained the typhus cases reported by our medical officers in the field during the war. The relatively large number during the first year, 2.84 per thousand of strength, decreased during the second year to 1.44, and continued to decrease to .52, .51 and .30 respectively during the third, fourth and fifth years covered by our statistics, as these fulminant cases were found to lack the contagiousness of true typhus and to be associated, from the etiological point of view, with the typhoid and typho-malarial cases which were prevailing in our camps.‡

Thus, Surgeon ZENAS E. BLISS, U. S. Vols., noted a fatal case of typhus in his command while at Yorktown, the patient dying with superficial ecchymotic blotches and hemorrhages from the nose and bowels; no *post-mortem* examination was held in this instance, but at the same time about forty cases of typhoid fever were under treatment, and in such of these as proved fatal the patches of Peyer were found to be ulcerated.§ Brigade Surgeon J. H. WARREN and Medical Inspector PETER PINEO, U. S. A., reported early in the war the presence of typhus fever in the camps near Washington, D. C. About the same time Surgeon BARR, 36th Ohio, recorded the assumption of a typhus character by fevers prevailing at Summerville, West Va., and Surgeon IRISH, 77th Pa., and Act. Ass't Surg. O. K. REYNOLDS, U. S. A., 15th U. S. Inf., reported similar cases from Camp Wood, Munfordsville, Ky. At a later date fulminant typhoid among undisciplined recruits at New Albany, Ind., gave rise

* Thus a certain number of the cases forming the basis of FLINT'S *Clinical Reports on Continued Fevers*, Buffalo, 1852, were reported as *doubtful*; his cases numbered 164, and of these 73 were undoubted cases of typhoid and 65 equally undoubted cases of typhus, but 26 were cases in which the diagnosis as between typhus and typhoid was not positively determined. The official *Medical and Surgical History of the British Army which served in Turkey and the Crimea during the war against Russia in the years* 1854–55–56, London, 1858, does not attempt to differentiate between the malarial and typhoid fevers which prevailed among the troops while operating in Bulgaria, nor between the typhoid and typhus which scourged them during the winter of 1854–55 in the Crimea; but Dr. ROBERT D. LYONS, in his *Report on the Pathology of the Diseases of the Army in the East*, London, 1856, shows that at the time of his visit to the hospitals and camps both typhus and typhoid were prevailing, the latter, however, being the prominent disease. He reached Scutari towards the close of April, 1855, when all but the expiring embers of the terrible epidemic of the previous winter had disappeared. Again, SCRIVE, in his *Histoire Médico Chirurgicale de la Campagne d'Orient*, Paris, 1857, describes, p. 418, a *typhus à forme typhoïde*.

† It is at the outbreak of an epidemic that the severest attacks manifest themselves. The first two cases observed at Lyons by M. DUSSOURT differed entirely from the stereotyped typhoid fever. They were consequently considered typhus cases, especially on account of the rapidity of their fatal termination and the absence of intestinal lesions. There existed, no doubt, a co-relation between these two facts, the absence of lesions being due to the shortness of the malady, for in all other autopsies made during the same epidemic, MM. MARMY and ALIX found the usual changes consequent upon typhoid fever. See LÉON COLIN, *De la Fièvre Typhoïde dans l'Armée*, Paris, 1878, p. 18.

‡ JAMES BRYAN, Brigade Surgeon, Burnside's Expedition, New Berne, N. C., *Boston Med. and Surg. Jour.*, Vol. LXV, 1862, p. 394, says, in some observations on the diseases of the army in the Department of North Carolina, that typhus fever was not unfrequently observed, and was in some cases of great malignity, a character which was more particularly noticed in young fleshy subjects. In one such case the patient was brought into the hospital in an insensible condition, with the cellular tissue of the neck filled with air and serum and the legs and feet purple. But we have already seen the pernicious character of the malarial fevers of this military department. On the other hand J. J. LEVICK, in an article on *Miasmatic Typhoid Fever, American Jour. Med. Sciences*, Vol. XLVII, 1864, p. 404, when referring to the aggravated character of the cases that arrived at the Pennsylvania hospital from the Army of the Potomac in the autumn of 1862, says that in no case was the true typhus fever-rash observed, nor a single instance in which the disease was known to have been communicated to another, notwithstanding that many cases were much like typhus.

§ Appendix to Part First of this work, p. 85.

to a report of typhus or spotted fever. In 1863 Ass't Surg. WARREN WEBSTER, U. S. A., who had seen European typhus in Boston Harbor from 1853 to 1860, became alarmed at the presence in the 12th Army Corps of some cases which appeared to present all the clinical features of true typhus, and in his report to the Medical Director of the Army the utmost care was enjoined for the protection of the troops against the contagion of this deadly disease. A month later Dr. WEBSTER was called upon to investigate some cases reported from the 11th Army Corps, but etiological considerations were opposed to the recognition of these as maculated typhus. A few cases of typhus, from two to seven, were reported during the year 1864 from each of eight regiments in the Army of the Potomac. In accordance with instructions from the Medical Director of the Army the history of these cases was investigated, and in every instance in which the surgeon who made the report was still on duty with the command, it was found that he had ceased to consider the disease to have been typhus. Concerning the cases reported from the Army before Corinth, Medical Director R. MURRAY, U. S. A., was of opinion that if the experience of Surgeon MAYLERT, U. S. Vols., who was in charge of the general field hospital, furnished no evidence of typhus, there was assuredly none among the troops. Surgeon MAYLERT's report on the fevers of this army has already been presented.* Those treated at the St. James hospital, New Orleans, La.,† were derived from General BUTLER's regiments, which, with few exceptions, had been crowded to excess on transports from New York to Ship Island, Miss. The passage to the Gulf occupied thirty to forty days, and many of the troops were closely packed on shipboard for sixteen days on the trip up the river to New Orleans. After this some of the regiments were sent to the forts at Carrollton and others to the swamps opposite Vicksburg, Miss. The report of Surgeon EUGENE F. SANGER, U. S. Vols., gives expression to the conditions affecting these men and the probable character of the fevers from which they suffered.

Brigade Surg. J. H. WARREN, *1st Brigade, Casey's Division, Washington, D. C., Jan.* 25, 1862.—The 1st brigade is finely situated on Meridian Hill, a very healthy location, the camp well policed and drained. The internal arrangements of the barracks are very bad, as the ventilation is not sufficient, and is obstructed by partitions across the building at intervals of ten or fifteen feet, destroying the free circulation of air. If this defect is not immediately remedied we shall have camp or typhus fever, as it has already made its appearance in the 56th N. Y., and in one case proved fatal.

Brigade Surg. J. H. WARREN, *on the condition of the 77th N. Y., Jan.* 27, 1862.—This regiment is encamped on the western slope of Meridian Hill. The ground, owing to its gravelly and porous nature, is as well adapted for a camp as any in the vicinity. The atmosphere is impregnated with a malarial odor, arising from an open field where a large number of dead horses are deposited on the surface and allowed to remain and decompose. This, with the rather poor policing of the camp, has given rise to typhus fever, from which, I regret to say, we have lost some ten or twelve men already. The tents are the wedge-tent, and have a wall of boards built up some three feet high, with the tent placed on top. As they have no door, using the fly as such, the men step over the boarding down into this box arrangement, which generates one of the most fetid and vile atmospheres that human beings can possibly be placed in. I suggested that the banking of earth about the boarding should be at once removed, and holes made through the walls near the floor that a free circulation of air may be had. I would also suggest that the regiment be removed to the grounds opposite the Columbian hospital. The men should sleep upon cedar leaves, which can readily be obtained at a short distance from here. They should not be allowed to keep fires in their quarters but a few hours by day and the same at night, nor should they be allowed to wear their overcoats or eat in the tents. A disinfecting agent should be thrown around their quarters and a strong solution of lime inside and out. Should these suggestions be adopted, I think all forms of typhus will speedily disappear from the regiment.

Report on Typhus by Medical Inspector PETER PINEO, *U. S. A.*—The 23d N. Y. moved Sept. 28, 1861, from Arlington, where it had been encamped some months, to Upton's hill. Because of what was considered a military necessity, the regiment occupied a hillside facing the northeast, the soil being a tenacious clay; the streets were very narrow, the A-shaped tents were close to each other, and the camp confined to the smallest possible space. During October and November I urged unsuccessfully its removal to a more salubrious locality. The importance of striking the tents, careful police and cleanliness was also urged upon the colonel and surgeon of the regiment, but without avail. An almost total neglect of all hygienic precautions ensued, superadded to which was the fact that five or six soldiers slept in each small tent, and as cold weather advanced, their habit was to hermetically seal the tent as

* *Supra*, p. 318. † *Supra*, p. 268.

nearly as possible, sleeping in a space of but little more than one hundred cubic feet. The circulation of air in such a tent is, it seems to me, of the following character: The canvas permits the ingress and egress of almost no air whatever. The expired air being heated and lighter rises to the top and sides of the tent, where it is immediately condensed, and falling to the bottom is again respired; this process is repeated constantly during the night, producing necessarily a condition scarcely rivalled by the "Black Hole."

This regiment was composed of as fine a body of stout and intelligent young men as any I have seen in the army; yet in November a large sick report was noticed, and in December the sickness and mortality became so alarming that I instituted a careful investigation. In one tent was found a soldier who had kept his tent for a day or two, had scarcely complained at all, but was *in articulo mortis*. The patients generally on first coming under notice of the surgeon presented grave symptoms; they were listless, stupid and greatly depressed, though uncomplaining. Cerebral symptoms were shortly manifested with sordes about the mouth and teeth, rapid and irregular pulse and death by coma often in from twenty-four to seventy-two hours after entering hospital. There was almost no convenience for *post-mortem* observation, yet in two or three cases autopsies were made by Surgeon WILCOX, 21st N. Y., at one of which I was present. The external appearance of the body was darker than usual and slight purpuric spots were present. No organic lesion was discovered, but there was unusual congestion of the internal organs generally. The symptoms above enumerated, with the history of the camp and the pathological appearances, led me to regard the cases as "typhus gravior," the result of "crowd-poison." It should be stated that malarial fever was the prevailing disease in the regiment previous to this alarming condition. It is also worthy of special notice that almost every case of sickness of grave character came from the shady side of the streets where no direct rays of sunlight ever found access. The 21st N. Y. was situated within a few rods of the 23d, in a valley, the situation being nearly or quite as objectionable. This regiment had served in and about Fort Runyon, and had strongly marked manifestations of malarial disease; but the police, cleanliness and ventilation were carefully attended to, and the regiment had only one death from disease in a year.

The camp was at length broken up and removed to a delightful spot; a foundation of logs three or four feet high was built on which was placed the tent; the streets were broad; cleanliness and ventilation were carefully attended to; the hospital, which had been in a small house with low ceilings and much crowded, was moved to a spacious church at Falls Church Village, and from being alarmingly unhealthy the regiment in a short time became one of the healthiest in the army.

Abstract of a Report of Surgeon R. N. BARR, *36th Ohio, for the four months ending Dec.* 31, 1861.* [During this period the regiment lost 27 men by death from disease; 16 of the deaths occurred among 344 cases of fever and 7 among 22 cases of typhoid pneumonia. The mean strength of the command in November was 38 officers and 984 enlisted men. It was stationed at Summerville, West Va.] Fever made its appearance in this regiment shortly after its arrival at Summerville in September. The troops relieved by it had suffered from typhoid fever and left behind them in a crowded building about forty cases of the disease. Even in the earlier cases there were differences from typhoid as ordinarily observed: Prostration was greater, and there was severe occipital pain with stiffness and soreness of the muscles of the neck, particularly the sterno-mastoid. The chills in miasmatic cases were slight but came on at regular intervals, usually in the early part of the day; and in the intermittent forms the febrile stage continued until late in the evening. The tongue was large and broad, indented by the teeth along its margin and creased in the centre, thickly and darkly coated on the dorsum and red on the tip and edges; it was tremulous and protruded with difficulty in the severer cases. Diarrhœa was of frequent occurrence but not obstinate. As the season advanced and a typhous condition became more and more developed diarrhœa became less frequent, and oftentimes the bowels would not move spontaneously in two or three days. Antiperiodics, even when remissions were decided, acted but indifferently, often increasing the cerebral and vascular disturbance and the dryness of the tongue and fauces; but during convalescence quinine in small doses, given in conjunction with wine, had a happy effect. By the middle of October cases of what seemed true typhus fever made their appearance. The pulse was frequent and feeble, the skin dry and dusky but not hot, the urine scanty and high-colored and the secretions generally deficient; the sclerotic had a bronzed appearance. From two days to a week from the beginning of the attack delirium or coma, partial or complete, would ensue; sordes collected about the teeth and lips and the tongue became dry and crisped. There was occasionally troublesome gastric irritability, but seldom any tendency to diarrhœa; no tympanites, and, excepting sudamina in rare cases, no eruption. If the patient survived this stage a profuse cold perspiration would come on, the tendency to coma would disappear, and for a few days there might be a partial return to consciousness. Hemorrhage from the bowels was not unusual, recurring at frequent intervals for several days; in these cases tenderness in the iliac regions was found to exist, and occasionally diarrhœa. During this sweating stage glandular swellings were present in almost every case of any severity, generally affecting the parotid and submaxillary glands, and in two cases the testicles; the swellings were large and terminated in suppuration more frequently than in resolution. Abscesses in other localities were also common, and from them would come an incredible amount of purulent discharge. Another singular symptom was the occurrence of an excruciating pain, apparently neuralgic, beginning in the great toe, gradually extending to the other toes and sometimes involving the whole foot and ankle joint; there was no swelling. This pain was invariably the harbinger of convalescence. This was so apparent and uniform as to be observed by the attendants, and Dr. BYAR quotes the nurse as saying to him: "Such a man is going to get well, for he has been groaning all night, or all day, with a pain in his big toe." About the beginning of December, while the daily average on the sick-list was 240, an ounce of whiskey was given morning and evening to every man on police or guard duty, and to others engaged in exhausting labor or exposed to inclement weather; this allowance was also given to nurses in hospital. Good results were expected "because of

*This report was published by surgeon BARR in the *Ohio Med. and Surg. Journal*, Vol. XIV, 1862, p. 65.

the great depression of the vital energies and impairment of innervation not only of those on the sick-list but of the whole camp." It is asserted that almost immediately after this, new cases of fever became infrequent and of a milder character, and that in three weeks very few occurred. Although the hospital was well ventilated, nurses were frequently attacked before the use of the stimulant, but after its regular issue such cases became rare.

Report on Typhus by Surgeon FRANKLIN IRISH, *77th Pa. Vols.*—During the month of January, 1862, a few cases of genuine typhus fever made their appearance in this regiment while encamped at Mumfordsville, Ky. The cases all occurred in a period of about ten days during a protracted spell of cold and wet weather which confined the men to their tents, the mud being so deep in the vicinity of the camp as to interfere with the usual parades and exercises. The cases presented the regular petechial blotches numerously distributed over the body; they were attended with sudden and excessive physical prostration and terminated fatally, generally from the fifth to the tenth day, death being usually preceded a few hours by delirium. I believe these cases to have been identical with the spotted or petechial fever of the books; in short, typhus fever of a most malignant type. In most instances the disease was perfectly intractable, the most active and vigorous stimulant treatment failing to rally or sustain the terribly depressed vital powers. I am unable to trace it to any malarious origin. It disappeared as suddenly as it came, and I do not know of its having appeared in any of the surrounding camps. I believe it to have been the result of the vitiated air of the tents, together with the depressing influence of long continued cold and wet weather, insufficient exercise and depraved diet surreptitiously bought from camp hucksters.

Report on Typhus in the 15th U. S. Inf. at Camp Wood, Ky., by Act. Ass't Surg. O. K. REYNOLDS, *U. S. A.*—During the period of my service with the 1st Battalion of this regiment, four cases of true typhus gravior were observed. No similar cases occurred in the brigade, nor, as I believe, in the division. The diseases prevailing at the time were chronic diarrhœa, dysentery and typhoid fever, and in many of the febrile cases there were evidences of malarial influence seen not only in a tendency to periodicity, but also in the color of the skin and in hepatic derangements. In most cases three things were worthy of remark: 1st. The adynamic condition of patients when first brought to the hospital tent. 2d. Intestinal congestions. 3d. The alvine evacuations, which were generally of a pale dirty-yellow color and quite thin, not offensive at first, but abominably so after a few days exposure in the sinks to a warm sun.

The two hospital tents of the battalion were situated on low ground near the head of a small ravine; there was a shallow sink not more than twenty-five feet behind one of them and above it, the ground being higher behind than in front. The patients lay on old straw which could not be replaced by reason of the scarcity of that article. Vegetation commenced under the straw, which was kept moist by its close proximity to the earth. The four typhus cases occurred in the tent on the low ground near the sink. These, when first brought in, exhibited few symptoms that were not common to every case of camp fever,—there was perhaps rather more debility and nervous prostration than in other cases; but a few days after their admission into the hospital tent stupor and low delirium supervened, and the stools became less frequent and scanty, darker in color and more offensive; the quantity of urine became diminished and the catheter was sometimes required; sudamina were seen in all and the rose-colored eruption in two of the cases, about the end of the first week, continuing until death. In one case epistaxis was troublesome. In all the pulse was small, weak and frequent and the tongue dry, brown and fissured; sordes accumulated rapidly on the teeth, gums and lips, and stupor deepened as the disease progressed. Brigade Surgeon CHARLES SCHÜSSLER, under whose orders I was then acting, regarded these cases as true typhus. In scarcely any other cases of fever at Camp Wood did I observe the disorder of intellect attending these cases; the patients were generally rational even just before death.

Since camp fever prevailed in all the neighboring regimental camps, while few if any other cases of typhus occurred, these four cases may reasonably be attributed to local causes. These I believe to have been the fetid gas arising from the sink and the vapor exhaled from the earth saturated with putrescent fluids under the straw on which the patients lay. But as there were nine men in the tent, it may be asked why did not more cases occur? Probably because some were less reduced upon entering the tent and others remained only a few days exposed to its miasms. I believe that any febrile case, if exposed to similar pathogenic causes for a length of time, would develope symptoms of a true typhus.

Extract from an Inspection Report of Branch Hospital No. 6, New Albany, Ind., by Medical Inspector L. HUMPHREYS, *U. S. A., Jan.* 14, 1864.—[The camp from which the New Albany cases were derived is thus described under date March 8: The troops consisted of seven companies of undisciplined recruits intended for the cavalry service,—present 432, absent with or without leave 219; total 651; number sick in camp hospital 68; severe cases are sent to general hospital at New Albany. The prevailing diseases are measles, pneumonia and intermittent fever,—typhus reported present in January has entirely subsided. The camp is in the fair grounds. There is but little natural drainage and almost no attempt has been made to improve it. The soil is blue water-holding clay which at the present time is worked up into mud. The water-supply is from cisterns and wells; the well-water contains iron and magnesia and produces diarrhœa in those who use it. The quarters are exceedingly filthy; the men cook, eat and sleep in them. The grounds of the camp are covered with garbage and filth. The sinks are so foul from deposited excrement that they cannot be approached without defilement. The unusually large number of sick in hospital is the legitimate result of a want of proper cleanliness and discipline.]

There are a number of cases reported by our medical officers as typhus or spotted fever in this and other branches of the general hospital in this city. The cases have all occurred among the recruits at Camp Noble, a short distance from town. When admitted they present delirium, great depression of the nervous centres, with obstinate vomiting, constipation of bowels and pain in the head; surface of the body cold, with tendency to collapse; pulse over 100 and compressible; petechiæ on the extremities, the spots reddish at first, subsequently turning dark; the attack generally sudden, running to a fatal termination in a few days. I saw one case just received in hospital

which had well-marked symptoms of cerebro-spinal meningitis, but *post-mortem* examination affords no evidence of inflammation of these tissues. The blood in the cadaver is reported to be in a liquid state, as in cases of death from electricity. Fifteen or twenty cases of this type of disease have occurred, many of them terminating fatally. Some of the men in Camp Noble, furloughed to their homes, became affected after arriving at their residences, other members of the family, in some instances, taking the disease apparently by contagion. The cases in hospital were all treated with tonics and stimulants. Nearly all under this treatment died. *Post-mortem* appearances indicating the use of an oxidizing remedial agent, cases occurring subsequently were treated by a free use of chlorate of potash conjoined with stimulants, tonics and opiates. Under this mode of treatment nearly all cases of this disease have recovered. Cases have occurred amongst the citizens of the country about New Albany.

In hospital this so-called "spotted fever" is isolated in a ward with 3,000 cubic feet of space to each patient.

Ass't Surg. WARREN WEBSTER, *U. S. A., on Typhus in the 12th Army Corps, Army of the Potomac, March* 5, 1863.—[This inspection was occasioned by the reported occurrence during February, 1863, of two fatal cases of typhus fever in the 123d N. Y. and five cases with four deaths in the 149th N. Y. The monthly report of Surgeon JOHN MONEYPENNY, of the former regiment, contains the following remarks: The regiment moved into an old camping ground situated near Stafford Court House, Va. The camp is located in a hollow between two ridges, near the edge of a brook. The soil is porous and the water filtering through it is in my opinion impregnated with an undue quantity of vegetable debris. We brought rubeola with us from our last camp at Fairfax Station. The men had made a hard march through the storms of December. The rations were salt and deficient in quantity. After the first week of camp life here diarrhœa of severe grade showed itself; this was followed by cases of remittent fever, generally assuming a low type; then typho-malarial, typhoid and typhus fevers made their appearance. Two of the cases, reported as typhus, occurred after convalescence from rubeola. Pneumonias were of a typhoid type and dysentery assumed the same sinking character. The health of the camp is bad, the situation is bad and the weather has been unfavorable for us to move; but I have chosen another locality and will probably effect the change next week.]

On my arrival Medical Director MCNULTY informed me that the only regiments in which the fever had existed were the 123d and 149th N. Y., and that there was now but one case in each regiment. The case in the latter regiment was not, in his opinion, of so malignant a type as the preceding cases in that regiment, and the case in the other command had, he believed, undergone decided amendment. He also infomed me that the camps of the infected regiments had been removed to sites offering in his judgment the best available combination of sanitary conditions. Both patients are isolated in separate hospital tents placed at a considerable distance from the old and new encampments of the respective regiments.

The reports already made by the medical director have given information of the number of cases of typhus reported by regimental surgeons as occurring in these two regiments and the number of deaths resulting therefrom; I therefore need not refer to them except to say in passing that while my inquiries lead me to doubt whether all the cases so reported were genuine typhus, it is undoubted that most of them were distinctly marked cases. Of the two existing instances there cannot be question. My opinions on the subject coincide fully with those of Surgeon MCNULTY, whose thorough professional training and extended observation of the disease in New York City make him especially acute in the recognition of the characteristic symptoms.

In compliance with orders to inquire into the causes of this formidable affection, I have to say that I deem the close aggregation of the men of the two regiments in huts of defective construction and on ground having a wet sub-soil imperfectly drained and previously occupied by troops, to be a conspicuous promoter of the disease now under consideration. The 123d regiment was quartered in huts 11×6×4 feet, with eight men to a hut. These huts had been recently abandoned by General Sigel's troops, and the New York regiment arriving upon the ground late at night occupied and remained in them without proper cleaning. Many were within one or two feet of each other. In the intervening spaces human ordure had been deposited; and I learned from the regimental surgeon that much of it had been allowed to remain there up to a recent time. Offal was also deposited from time to time in offensive proximity to the camp. Huts originally intended for the accommodation of a single regiment have been inhabited, since the arrival of the 12th Corps, by two regiments recruited six months ago, and therefore not reduced in numbers. The thin tent-cloth with which the huts were roofed admitted some air of course, when dry, through the interstices of the fabric, but when wet it was almost impervious. No system of ventilation was practiced, and the drainage of the camp was unattended to although the face of the ground presented every facility therefor. The reason assigned for these surprising neglects is that the command was daily expecting to move. This regiment, when organized in northern New York in August, 1862, consisted, I am told, of a fine body of 923 men. It has been in camp at Washington, Arlington Heights, Pleasant Heights, Loudon Valley, Fairfax Station and in the locality I am describing, and at each of these places except the last, camps were generally made on ground not before occupied. Its duty has been picket, fatigue, guard duty, marching and the customary drills, and its sanitary condition has in general been quite good. Diarrhœa, malarial disorders, measles and a few cases of typhoid have occurred. The present typhus patient, who fell sick February 5, was in a partially excavated hut, 6×7 feet in area, in which five men had slept during the first fortnight. More recently the invalid and one or two well men occupied the hut.

On the 3d inst., day before yesterday, the regiment was, with the exception of the sick, removed to a new camping ground selected about a week ago. A new hospital, just obtained, and favorably located near by, contains the typhus patient. On visiting the new camp I found the site good, but the huts built irregularly and much too close together. As the result of a conference with DR. MCNULTY and myself, the colonel of the regiment determined to immediately tear down the huts, build anew over a larger area, and allow no excavation of the floors or heaping up of earth on the outside of the walls. He resolved also to drain the camp systematically, protect from surface-water by catch-water drains, ventilate the huts thoroughly each day, exercise a rigid police of the camp

and interior of the huts, enforce cleanliness by bathing, which had never been attended to, and cause the undergarments of the men to be frequently washed. An inspection of the persons of the men by me was unnecessary, as it was frankly admitted that they were in a filthy state. Their physiognomy, however, did not indicate the cachexy which their wretched habits led me to expect; on the contrary I was surprised by their comparatively healthy appearance. I found in the regiment seven grave cases of typhoid fever, which, although not beset by the same dangerous elements of infection and self-propagation as typhus, still call as loudly for correction of the sanitary negligence which has given rise to both the allied diseases; and now that the insalubrious locality, the defective accommodations of the troops and the tainted atmosphere to which they were subjected have been changed and isolation with improved treatment of the single typhus case secured, we may confidently hope for the speedy eradication of these formidable disorders of the regiment.

The existence of typhus fever in the other regiment, the 149th N. Y., is attributable to influences similar to those reported above as having prevailed in the 123d. * * * * Much credit is due Major General SLOCUM for the promptness and energy with which he has employed the measures suggested to arrest the spread of fever and prevent its assuming an epidemic prevalence. He yesterday issued a general order positively prohibiting throughout his command—1st. The habit of sinking the floors of tents and huts below the surface of the ground. 2d. Occupation, in encamping troops, of spots recently used for that purpose; and 3d. Employment, in the construction of new huts, of any portion of old ones. The practice of using portions of abandoned huts in the construction of new ones on adjacent ground, in order to avoid the labor of procuring other materials, is so general that it made necessary the third paragraph of this order. Many points of improvement were urged upon the officers of the infected troops; but it was deemed unnecessary to request General SLOCUM to publish them. The troops are now sufficiently aware of their commanding general's earnestness in the matter to insure observance of verbal suggestions, and the intelligence and energy of Surgeon MCNULTY will accomplish everything to be desired of the medical officers under his direction. I think the officers with whom we conversed, line as well as medical, are convinced of the general injurious consequences certain to flow from overcrowding and defective ventilation, and more especially how much the prevalency and fatality of typhus depend upon the nature of the in-door accommodation with which the soldier is provided. Inattention to the purity of the air in each tent or hut, to personal cleanliness, constant supplies of fresh clothing and bedding, defective cooking and the accumulation about camps of decomposing vegetable and animal matters have been pointed out to them as potent influences in the production of camp fever. Advice was given to the attending medical officers with reference to the management of the disease, and if fresh cases should occur they will use the promptest means to isolate the patients and will urge the commanding officer to the adoption of any measure, no matter how extreme, necessary to arrest the evil.

Ass't Surg. WARREN WEBSTER, *U. S. A., on supposed Typhus in the 11th Army Corps, Army of the Potomac, April* 17, 1863.—I have the honor to report, after careful investigation, that I am not convinced that the sudden death of one of the quartermaster's employés at Hope Landing, reported by Medical Director SUCKLEY, 11th Army Corps, was, as he believes, a case of *maculated typhus;* nor do I think that any active hygienic or precautionary measures need be taken to prevent a spread of the disease existing in the command there.

The two regiments, the 107th and 134th N. Y., composing the command at Hope Landing, have suffered greatly from sickness since their entry into service about eight months ago. Before and since their arrival at that point, two months ago, typhoid fever has been very prevalent and fatal, assuming during the autumn and fall months unusually severe enteric symptoms and during the winter marked cerebral complications. The latter symptoms were by some of the medical officers interpreted to denote typhus, particularly as several of the cases so characterized were speedily fatal and the diarrhœa and meteorism usually attending enteric fever were absent or slight. I can learn, however, of two cases only which presented cutaneous eruptions differing materially from those peculiar to typhoid fever, and they were rather extensive ecchymotic patches of subcutaneous extravasation varying in size from a grain of wheat to one's hand, than the peculiar eruption deemed distinctive of contagious typhus: One of these was the case of the quartermaster's clerk; the other occurred in the 107th New York regiment about a week ago. Both were marked by nearly the same course, death resulting in less than twenty-four hours. The patient (a few hours before in apparent good health) complained to the surgeon of violent pain in the head, back and extremities, and the appearance of the countenance and hue of the skin presented evidence of great internal congestion. The pulse was small until death, at times almost imperceptible. Persistent vomiting characterized the last case. Delirium was not violent, but comatose symptoms soon prevailed. The patients suffered from involuntary urinal and fæcal discharges. An examination of the first patient a few hours after the attack, and of the other shortly before death, revealed cutaneous ecchymotic patches of extravasated blood varying greatly in form and size, and invading the body, limbs and even the face. No *post-mortem* investigation was made in either case. The treatment consisted primarily of cups, mustard applications to the extremities and a large dose of calomel and rhubarb, with the subsequent employment of camphor, quinine and alcoholic stimulants. This treatment was attended with only partial reaction and improvement of the pulse. The soldier thus affected had been on duty as a teamster for two months previous to the attack, was provided with good and well-prepared food, an abundance of vegetables and ample clothing, was represented to be unusually cleanly in his personal habits, and habitually slept in his wagon, which had no other tenant during the night but himself. The quartermaster's clerk was a man of scrupulous personal cleanliness, lodged in a well-ventilated Sibley tent, and had the reputation of being a free rather than a spare liver. The favorable relations of these men to air, food, clothing and personal attentions certainly contradict the supposition that they were victims of typhus. The character and stage of appearance of the cutaneous eruption, and the slight degree of delirium which characterized the cases are also, in my opinion, in opposition to the existence of the supposed disease. If it be claimed that typhus was communicated to them by contagion, I do

not understand where was the contagious source. No other cases, answering even as well as these to the characters of typhus, have existed in the command. No exposure to fomites is likely to have occurred; nor was the second sufferer known to have been submitted to contagious propinquity to the first.

Surgeon FLOOD of the regiment in which the first of these mysterious cases occurred informed me that the typhoid fever of the command had, within two weeks, almost completely lost its tendency to cerebral congestion, and that pneumonia was now the prevailing complication. One regiment yesterday removed to near Brook's Station; the other daily expects to change its location. In view of these facts I deem it necessary neither to draw your attention to the objectionable exposure of Hope Landing to vegetable malaria nor to recommend at present any sanitary reforms in the regiments lately composing the command.

Surgeon EUGENE F. SANGER, *U. S. Vols., Third Division, 19th Army Corps, on the Fevers that prevailed in New Orleans and its vicinity in* 1862.—Four important elements entered into the causes of so much disease and such fearful mortality. 1st, *Scorbutus:* The diet had been uniformly salt meat, hard bread and coffee. The transports were too crowded to admit of thorough policing, and the public buildings and cotton presses were too dark, damp or hot. After long confinement, poor diet and habitual uncleanliness, there was nothing in the surroundings of the men to excite their pride or arouse them to a proper appreciation of the importance of attention to hygienic measures. 2d, *Typhus poison:* The entire command had been situated for many months where systematic ablutions could not be performed. The skin was active and performed important functions; it supplied the place of the kidneys largely in carrying off the disintegrated tissues. Men lay down in clothing saturated with effete animal matter and were compelled to breathe constantly the poisonous exhalations of the human body. Reabsorption necessarily followed. 3d, *Typhoid poisoning:* Scorbutic diet soon began to tell upon the stomach, destroying its nervous energy; food fermented, noxious gases formed, the bowels became irritated and imperfect digestion and nutrition followed with emaciation, debility, diarrhœa and fever. 4th, *Malaria:* As early as May dumb agues appeared, and by June intermittents and remittents prevailed generally. The city proper was free from malaria. The 14th Me., while quartered in the city during the months of June and July, suffered badly from typhus but was entirely free from malaria. On the immediate banks of the river at Carrollton the troops were generally exempt from malaria; the 12th Conn. escaped almost entirely. On the other hand, regiments in the fortifications running back from and at right angles to the river, toward the swamps, suffered terribly,—the 14th Me., stationed at Carrollton during September and October, was reduced from 700 strong for duty to 56 in about twenty-eight days. About June 1 six regiments embarked for the swamps opposite Vicksburg and remained exposed to the inclemencies of the weather and pestiferous miasms for more than six weeks.

General Butler's command originally consisted of seventeen regiments with batteries and some cavalry, and in the course of eight months almost the entire force suffered from the causes of disease above enumerated. The 13th Conn. was a noteworthy exception: It embarked at New York late in March, and had a short passage to Ship Island, where it remained until the city surrendered; at New Orleans it was quartered in the custom-house. It had better accommodations at sea, was confined on shipboard for a shorter period and was more rigid in policing. This regiment lost very few men during the summer.

I did not test the accuracy of my diagnosis by *post-mortem* examinations, and I have not the record of a case showing implication or exemption of Peyer's patches; but the symptoms were sufficiently convincing. I invariably found the patients extremely debilitated from the first, with early tendency to slipping down in bed and deafness, dark-brownish and dry tongue, petechial eruption, small and feeble pulse, tense and flat bowels, at first constipated, followed by hemorrhages and diarrhœas. Quinine, whiskey and beef-tea were the only remedial agents admissible. I was in the habit of combining a little opium with the quinine to correct its cinchonizing effects, and ipecacuanha to stimulate the capillaries. The 14th Me., quartered in Lafayette Hall, lost as many as twenty cases of typhus during June; some of these died at their regimental hospital, the others at the St. James. This regiment became so thoroughly used up that over 300 men were discharged from it during the months of June and July on surgeon's certificates, and as many acclimated men enlisted at New Orleans. Other regiments had distinctive typhoid: I remember seeing in one regiment some thirty well-marked cases—beef tongues, rose-red spots and tympanitic bowels.

The regiments that suffered most were the 7th Vt., 30th Mass. and 9th Conn. Arriving at New Orleans worn and debilitated, scorbutic in habit and saturated with zymotic poison, they were allowed but a few days at that city and Carrollton before they were sent to Vicksburg. Thence they returned to Baton Rouge, participated in a brisk fight on August 6, and were compelled to abandon the place about the end of that month. On their return to New Orleans these regiments were a sight to behold. The scenes on board the boats which brought the sick beggar description—the dead and living locked in one embrace. Reduced to shadows by diarrhœa and fever a single paroxysm sufficed to snap the cord. Men put on board at Baton Rouge for simple debility were enveloped in their winding sheets before they reached New Orleans: I counted seven dead bodies on one boat. These remittents or intermittents had but one paroxym; seldom would there be any febrile reaction. The collapse was almost as perfect as in cholera—features sunken, skin cold and livid, voice husky, pulse small and quick, stomach irritable and mind torpid. The patients complained of burning in the stomach and exhaustion; they seemed wholly unconcerned whether they lived or died, and continually tossed to and fro until death relieved them from their sufferings. Warm frictions, stimulants and large doses of quinine occasionally revived them.

The 7th Vt. lost 300 men in the eight months from May to December, the 30th Mass. 215, and the 6th Conn., a small regiment of less than 700 men, 169. During this time I think we must have lost quite 20 per cent. of the entire command by death, to say nothing of those discharged for disability.

Nevertheless, although typhus was fortunately a stranger to our camps, there appears

strong ground for believing that an epidemic of this disease prevailed among some rescued and paroled prisoners received at Wilmington from Salisbury, N. C., in the spring of 1865. The number of prisoners was 8,600, and of these 3,400 had to be cared for in Wilmington as they were unable to undertake the voyage northward. The disease spread from them not only to the troops of the garrison but also to the citizens of the town and the residents of the surrounding country. Surgeon D. W. HAND, U. S. Vols., then Medical Director of the Department of North Carolina, furnished a special report of this epidemic, which he considered to be undoubted typhus. It is addressed to the Surgeon-General of the Army and reads as follows:

WILMINGTON, N. C., *March* 10, 1866.

GENERAL: I have the honor to report that, in compliance with your instructions, I have collected all available facts relating to the epidemic fever that prevailed here in the spring of 1865.

Wilmington surrendered February 22 of that year, and our troops on entering found the city in a very filthy condition and the inhabitants that remained in a violent state of alarm. The city up to that time had been quite as healthy as usual, and no epidemic had prevailed among the Confederate troops that formed its garrison.

On the 25th and 26th of February 8,600 Union prisoners were exchanged at Northeast Station and immediately sent down to this city. Of this number about 3,400 were too sick or weak to bear transportation by common transports and had to be cared for in hospital. Under the direction of Surgeon EDWARD SHIPPEN, U. S. Vols., at that time senior medical officer in Wilmington, they were placed in public buildings and deserted dwelling houses in all parts of the town. The sick from the troops on duty near Wilmington, and also those sent from Fayetteville by General Sherman, were admitted indiscriminately to these same hospitals.

During the first week of March or very soon after the arrival of these prisoners an epidemic, which was undoubtedly *typhus* or *jail fever*, appeared in the hospitals and rapidly extended to the citizens in the town.

I find that between February 26 and June 30 about 1,200 white soldiers and 300 colored soldiers died of disease in Wilmington and its vicinity. The epidemic fever prevailed from March 1 to June 1 and caused, so far as can now be ascertained, about 650 of these deaths, viz: 300 exchanged prisoners, 200 other white soldiers and 150 colored soldiers. The records of the Wilmington hospitals are so incomplete that no estimate can be made of the number of soldiers who suffered from an attack of this fever.

Owing to the peculiar state of local affairs at that time the number of deaths among citizens cannot be ascertained; but the resident physicians testify that the fever spread extensively among them and that many died. Among the refugee negroes sent down to Wilmington by General Sherman it was particularly fatal; several thousand of them were put in camp about April 1 near Fort Anderson on the Cape Fear River, and it is thought over 1,000 deaths from typhus fever occurred among them.

It was noticed by the medical officers that the attendants and other soldiers about the hospitals, who contracted the fever from the returned prisoners, had it more violently than the prisoners themselves,—the weak, half-starved prisoners having a better chance of recovery than the strong, healthy attendants. Most of the medical officers and attendants contracted the fever. Five surgeons and assistant surgeons, two chaplains and about eighty detailed attendants were among those who died.

The evidence on all sides is conclusive that this fever was brought into Wilmington by the exchanged prisoners. No doubt the crowded and badly ventilated hospitals intensified the poison; but I am satisfied this type of fever existed among the prisoners at the time they were received within our lines.

It was contagious.—Several of the most intelligent physicians in Wilmington think it only prevailed as an epidemic and was no more contagious than yellow fever; but some facts have come to my knowledge which show that it was more than that. Of the officers and men employed on the steamboats that brought the prisoners from Northeast Station to this place nearly all took the fever and several died. They were not known to have been in or about the hospitals after the prisoners were landed in Wilmington. It is known that typhus or a low form of fever prevailed in the families of several planters in this state, conveyed to them by negroes who had recently returned from Wilmington. Particularly was this the case in Richmond and Robinson counties, on the line of General Sherman's march. The negroes followed the army to Fayetteville, and thence passed down to Wilmington; but finding it a hard place to live in many went back to their old masters in May and June and carried with them the fever that was prevailing in the city. Mrs. Gilchrist, living near Montpelier, Richmond county, 104 miles from Wilmington, had some of her negroes come back in this way. Several had the fever after their return. Mrs. Gilchrist suffered a violent attack, but recovered; her son, aged twenty-one years, died. Other white persons in the same family afterwards had the fever but recovered. Mr. McEahan lives on the Lumber River, three miles above Mrs. Gilchrist's place; his negroes carried the fever from Wilmington, and several members of the family took it; one daughter died. Mr. D. St. Clair, in the same neighborhood, had a like experience and lost his daughter. Dr. John Maloy, in Robinson county, had his negroes who remained at home infected in the same way and lost several. His family was mildly attacked.

The physicians in Wilmington estimated the period of incubation of this fever at from four to twenty days.

Symptoms.—It began like an ordinary fever with a chill, followed by more or less heat of skin and great weariness with pain in the back. The languor was excessive. Violent headache does not seem usually to have accom-

panied it; but the eyes were red, watery and intolerant of light. The tongue was dry in the middle with red tip and edges; sordes appeared early on the gums, and there was great thirst. Almost from the beginning there was uneasiness or pain in the stomach, with tenderness over the whole abdomen; gurgling was heard in the right iliac region, and generally there was diarrhœa. In the later stages hemorrhage from the bowels was not uncommon. The urine was scanty and high-colored, and in bad cases frequently entirely suppressed. The pulse was full and slow, often only 45 to 60 per minute, but easily compressible. The skin was frequently bathed with perspiration without the fever or heat of skin abating. Petechiæ appeared early, and also at times an eruption like urticaria. Towards the end spots like purpura often appeared. Jaundice frequently supervened, the skin and conjunctivæ becoming intensely yellow. Vomiting of a dark-colored fluid, which when dried on a cloth appeared somewhat yellow, was also not uncommon. Sometimes the patient died on the fourth or fifth day with symptoms of congestion of the brain or lungs; but usually the case ran on from fourteen to thirty days.

From the notes of Dr. J. F. KING, a prominent medical man in Wilmington, who served for some months in 1865 as a contract physician in the hospitals there, I select two cases as fair examples of the disease:

CASE 1.—*Severe; resulting in death.*—Mr. Brynim, citizen; age 28 years; weight 175 pounds; moderately temperate; full habit; enjoying good health during whole life, visited a sick friend in hospital. Two days later, March 11, complained of loss of appetite; was languid and oppressed; had soreness of muscles; took a purgative dose of blue mass. That night had a chill with rigors; much prostration; fulness and tenderness in the epigastrium; nausea and vomiting. I saw him next day: Fever; pulse about 90, full, easily compressible; tongue dark, dry, with red edges, attended with urgent thirst; great exhaustion; breathing accelerated, with occasional sighing and bronchial cough; sordes on the teeth and lips; skin hot and husky; bowels loose; discharges yellow, watery and excessively offensive; gurgling in right iliac region; tenderness over the entire abdomen, particularly in the epigastrium; urine very scanty, passing only about a tablespoonful, very dark and offensive; breath extremely fetid. Administered stimulants; potassæ chloras in camphor juleps; mustard, brandy and pepper externally, etc. The above symptoms continued until the fourth day, when the countenance became dingy (livid) with flushed cheeks; injected eyes, dark-yellow in appearance and heavy, with unsteadiness of vision and intolerance of light. The whole surface was covered with a miliary eruption and badly jaundiced; violent delirium; great prostration; passed no urine for eighteen hours; cough dry and frequent; much nausea; bowels loose. *Fifth day:* Somewhat better; retained a little nourishment; voided about two ounces of urine. *Sixth day:* About the same. *Seventh day, early morning:* Skin clear; voided ten ounces of urine during the night; less delirium; retains nourishment and stimulants. 10 *A. M.:* Skin jaundiced; delirium violent; involuntary discharges of clotted blood. 3 *P. M.:* Surface much paler; abatement of delirium; skin hot with slight perspiration; bowels checked; great prostration. 7 *P. M.:* Died. Surface of a greenish-yellow color.

CASE 2.—*Milder: recovery.*—MR. M. JOHNSON, Quartermaster's Department, complained April 20 of loss of appetite, languor, soreness, fulness and tenderness in epigastrium, followed by prostration and rigors with fever: Pulse about 100, full, easily compressed; tongue brushed over with a white fur: urgent thirst; nausea and vomiting: breathing somewhat accelerated with slight cough: skin rather hot, but chilly when the covering is removed; occasional attacks of sweating of short duration, unattended with any abatement of the fever; countenance dingy: cheeks flushed; eyes watery and intolerant of light; pain in back of head: deafness; pain in loins; urine free: bowels constipated. *Fifth day:* Not much alteration except red tongue with elevated edges and hard dry centre: restless and somewhat delirious; sleeps only from effects of opiates. *Twelfth day:* Urine rather scanty; bowels in good condition; skin hot with gentle perspiration; delirium; tenderness over the abdomen; pulse 135. *Seventeenth day:* Not much alteration except the tongue more moist; increased quantity of urine; bowels constipated. *Twentieth day:* Decided improvement; tongue slightly coated with a yellowish fur and moist: delirium lessened: sleeps more quietly; pulse 110. After this the patient gradually recovered, having been able to leave his room and go down stairs on the thirty-first day from the beginning of the attack.

No *post-mortem examinations* of an official character were made. This is much to be regretted, but under the circumstances cannot much be wondered at. The physicians of the city were greatly depressed in spirit and many of them sick; and the medical officers of the army were overwhelmed with the vast amount of work so suddenly thrown upon them. But although no systematic autopsical investigations were instituted the intestines were examined in a number of cases in none of which was there any affection of the glands of Peyer. Personally I conducted two examinations for the determination of this point.

Treatment.—Stimulants were required from the beginning, and rarely could a purgative dose of medicine be given with safety. Medical officers at the hospitals noticed that on two occasions, when the supply of stimulants was exhausted for a few days, the mortality became much increased. Chlorate of potash was useful in small doses, and camphor seemed the best anodyne because of its stimulant effect. Those patients apparently did best that received little medicine, but whose strength was sustained by the regular administration of nourishment and brandy or whiskey. Quinine was of no apparent benefit. Oil of turpentine does not seem to have been much used, but in a few cases it was given and appeared to relieve the intestinal irritation.

This fever appears to have prevailed also among those of the released prisoners who were considered able to undertake the journey to New York: but there is no direct reference to a contagious quality in the only sanitary report which speaks of it.

Medical Inspector GEO. H. LYMAN, *U. S. A., on febrile cases at David's Island, New York Harbor, May,* 1865.—A form of low fever with eruption prevails among the recent arrivals from General Sherman's troops. It is unusually

fatal, and though differing somewhat from true typhus, bears more resemblance to it in its essential features than any other fever I have met with. The released prisoners from Charlotte and Salisbury arrived in pitiable condition. In some instances both lower extremities were lost from the effects of frost.

IV.—POST-MORTEM RECORDS OF THE CONTINUED FEVERS.

In presenting the *post-mortem* records of the continued fevers it has been deemed advisable to submit, in the first instance, such cases as may be of value in determining the nature of the large number reported as typho-malarial subsequent to June 30, 1862. Since this title was intended to include only modified typhoid fever, the *post mortem* lesions of that fever should of necessity have been found in all cases.* Dr. WOODWARD, sixteen months after the introduction of the term, described the intestinal lesions of typho-malarial fever as consisting of tumefaction and ulceration, with the occasional deposit of pigment in the closed follicles of the small intestines;† and from this it may be inferred that all the typho-malarial cases brought to his notice up to that time had presented ulceration of the intestinal glands due to the action of the typhoid poison. But as has already been shown, the mortality statistics of the cases reported as typho-malarial are inconsistent with the idea of an ever-present specific enteric element; and this doubt as to the nature of these febrile cases becomes strengthened by observing that the records of the Seminary hospital attach a higher rate of fatality to typhoid fever when modified by malarial manifestations than when not thus modified.‡

To pursue this inquiry it is needful to compare the anatomical lesions of the two classes of cases. This has been done incidentally while arranging certain of the *post-mortem* records for publication. Submitted below are: 1st, such febrile cases as have the diagnosis *typhoid* more or less sustained by the recorded symptoms; 2d, cases entered as *typho-malarial*, whether accompanied or not by their clinical histories; and 3d, cases which, although recorded as *typhoid*, nevertheless present in their history symptoms suggestive of malarial complications. To permit of the ready comparison of these three sets of cases as well *inter se* as with the remainder of the *post-mortem* records of the continued fevers, they have been arranged in accordance with the characters of the intestinal lesions so far as it has been possible to determine these from the records.

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* See note, page 273, *supra*.

† In his *Outlines of the Chief Camp Diseases of the United States Army*, Phila., Pa., 1863, pp. 100 *et seq.*: "In the *solitary* follicles of the small intestine the lesion is manifested as a gradual enlargement of these organs, the contents of which become soft, pulpy and very frequently blackened from deposits of pigment. All possible stages may be observed, from a barely perceptible enlargement to a little tumor the size of a pea, or even larger, corresponding to the situation of the follicle; the summits of the larger of these tumid follicles are frequently the seat of a small ulcer. Such ulcers are especially to be observed in the ileum, but the enlarged follicles are encountered throughout the whole length of the small intestine. The ulcer, originating thus in a single closed follicle, may remain of small size (one to three lines in diameter), or it may enlarge, invade the surrounding tissues and produce an ulcer (six lines to an inch, or even more, in diameter) resembling the ulcerations of the patches of Peyer in character, though not in shape or situation. The agminated glands or patches of Peyer undergo similar changes. As a general rule, every patch is more or less involved, those high in the intestine being less affected and the tumefaction being most intense towards the lower part of the ileum. The characteristic ulcer occurring in the patches of Peyer is oval in shape; occupies more or less completely the tumid group of follicles; its edges are jagged and irregular, often undermined. The base of the ulcer is of a dirty ash color, often with a yellowish tinge, occasionally mottled with dark, blackish points from the presence of pigment. It may occupy any fraction of the thickness of the mucous membrane. Sometimes it is limited to the follicular apparatus; in its later stages, however, it usually invades more or less profoundly the submucous connective tissue, and it may even involve the muscular coat. In the latter event, it sometimes penetrates the muscular layers, erodes the subperitoneal connective tissue, and, in extreme cases, penetrates the peritoneum and produces a perforation, through which the intestinal contents may find their way into the general cavity of the abdomen and give rise to a fatal peritonitis." At this time Dr. WOODWARD was inclined to regard the ulcerations of typho-malarial fever as characterized by certain peculiarities often sufficiently distinctive to enable the anatomist to recognize the fever by the *post-mortem* appearances alone; but a larger experience demonstrated to him that these ulcerations differed in no respect from those produced by typhoid fever. See p. 36 of the pamphlet edition of his *Address on Typho-malarial Fever* in the Section of Medicine, International Medical Congress, Phila., 1876.

‡ *Supra*, p. 308.

CASES IN WHICH THE DIAGNOSIS, TYPHOID, IS MORE OR LESS SUSTAINED BY THE CLINICAL HISTORY—50 CASES.

(A.) Peyer's patches ulcerated and the ileum or small intestine only affected—20 cases.

CASE 1.—Private Joshua Watson, Co. C, 7th Fla.; age 40; was admitted March 22, 1864. He had been sick for some time and was much debilitated; his skin hot, tongue dry, teeth covered with sordes, pulse quick and small, countenance dull, expression vacant; there was tenderness and gurgling in the right iliac region. On the 25th he was suddenly attacked with symptoms of acute laryngitis, resulting in death the same day. *Post-mortem* examination: The glottis and surrounding parts were swollen, apparently from fibrinous exudation beneath the mucous membrane. The patches of Peyer were thickened and ulcerated.—*Act. Ass't Surg. M. K. Gleason, Rock Island Hospital, Ill.*

CASE 2.—Conscript Phineas Moody; age 29; was admitted Sept. 3, 1863. He was taken sick August 6 with diarrhœa which continued a week, and was followed by a chill and fever. On admission the pulse was 96, the tongue dry and brown; he had some diarrhœa, slight delirium, severe and constant cough, with mucous râles in both lungs, but no rose-colored spots. Two days later some red blotches appeared on the face, arms and chest, and there was dulness with subcrepitant râles in the lower lobes of both lungs. Six ounces of whiskey were taken daily, but on account of prostration the quantity on the 10th was increased to sixteen ounces. 12th: Skin moist; tongue furred yellow; no delirium. Whiskey reduced to six ounces. He continued to improve under this treatment until the 25th, when fever, dyspnœa and great prostration set in, with colliquative diarrhœa two days later, and death on October 3. *Post-mortem* examination ten hours after death: Body emaciated; lungs congested; liver enlarged and fatty; spleen enlarged and pulpy; kidneys large and granular; many of Peyer's patches ulcerated, especially those near the ileo-cæcal valve.—*Central Park Hospital, N. Y. City.*

CASE 3.—Private Nathaniel Newell, Co. E, 186th N. Y., was admitted Nov. 30, 1864, from City Point, Va., where he had been sick two weeks with typhoid fever; tongue dry and brown; sordes; anorexia; diarrhœa; involuntary stools; extreme tenderness over small intestine; low delirium; pulse 120, weak, tremulous. He died next day. *Post-mortem* examination: Peyer's patches much ulcerated; spleen enlarged and softened; lungs œdematous posteriorly.—*Third Division Hospital, Alexandria, Va.*

CASE 4.—Private James Foster, Co. A, 139th Pa.; age 20; was admitted March 11, 1864. On the 13th the abdomen became tympanitic and there was gurgling in the right iliac fossa. He died on the 24th. *Post-mortem* examination six hours after death: Peyer's patches extensively ulcerated; solitary follicles enlarged; other organs healthy.—*Third Division Hospital, Alexandria, Va.*

CASE 5.—Private Wm. H. Hartley, Co. G, 22d Pa. Cav., was admitted Oct. 10, 1864. 13th: Delirious at night; petechiæ on abdomen and extremities; pulse 120; tongue moist; slight tympanites; subcrepitant râles and friction sounds on the right side of the chest. Prescribed stimulants, eggs, and twelve grains of sulphate of quinine daily in divided doses. 14th: The soft tissues over the right hip and sacrum began to slough; removed patient to a water-bed. He sank rapidly and died at 10 P. M. *Post-mortem* examination disclosed the lower lobe of the right lung in the third stage of pneumonia and part of the middle of the left lung in the second stage; the right lung was lightly adherent to the walls of the chest, and the cellular tissue in the neighborhood was somewhat emphysematous. The colon, duodenum and jejunum were distended with gas; the ileum contracted; Peyer's glands more or less inflamed, and many of those near the ileo-cæcal valve ulcerated.—*Act. Ass't Surg. W. L. Wells, McClellan Hospital, Philadelphia, Pa.*

CASE 6.—Private Jeremiah O'Brien, Co. G, 24th N. Y. Cav.; age 19; was admitted July 21, 1864, having been sick a week with typhoid fever. On admission his pulse was 88 and full, bowels soluble and tongue moist; but there was pain in the right iliac fossa, with delirium and sleeplessness. The pulse became more frequent and less full, the abdomen tympanitic, the stools involuntary and the urine retained, necessitating catheterization. He died on the 27th. *Post-mortem* examination: The right lung was consolidated posteriorly; the intestines contained five lumbricoid worms and an unusual amount of fæces, natural in color but soft. Peyer's patches were thickened and inflamed, those near the ileo-cæcal valve ulcerated; the solitary follicles also were inflamed.—*Act. Ass't Surg. Henry Gibbons, jr., Douglas Hospital, Washington, D. C.*

CASE 7.—Private Edward Brown, Co. H, 35th Mass.; age 18; was admitted Dec. 16, 1864, with typhoid fever. The patient was but partially conscious, had frequent involuntary stools, epistaxis, quick pulse, tenderness over abdomen, particularly in right iliac region, rose-colored spots and well-marked sudamina; he had muttering delirium and picked at the bedclothes. On the 18th his tongue resembled a piece of unpolished mahogany and his teeth and gums were coated with sordes. He died next day. *Post-mortem* examination five hours and a half after death: The brain was normal. The larynx and trachea were healthy; the right lung weighed twenty ounces and a half, the left seventeen ounces, the lower lobe of each in a state of red hepatization and the inferior portion of the upper lobe of the right lung congested; the heart was normal. The liver weighed seventy-two ounces and was somewhat flabby; the spleen sixteen ounces; several of Peyer's patches were ulcerated; the solitary glands much enlarged and many of them ulcerated; the left kidney somewhat congested.—*Act. Ass't Surg. H. M. Dean, Lincoln Hospital, Washington, D. C.*

CASE 8.—Private Herbert Vaness, Co. D, 171st Pa.; age 20; was admitted July 8, 1863, with typhoid fever of twelve days' duration, which progressed favorably until the 9th, when diarrhœa set in. On the 15th there was delirium, with dry and tremulous tongue, sordes on the teeth and swelling of the abdomen; a troublesome hacking cough was also present. He died on the 17th. *Post-mortem* examination ten hours after death: The brain weighed fifty-eight ounces and a half; its membranes were considerably congested and its substance rather soft; a small quantity of fluid was found in its ventricles. The trachea was much congested, of a purplish-red color and filled

with bronchial secretion; the lymphatic glands at its bifurcation were enlarged, blackened and softened. The upper lobe of the right lung was highly congested, especially at the apex; the middle lobe was also somewhat congested and presented evidences of bronchitis posteriorly; the lower lobe was intensely engorged, purple in color and in some places almost black. The left lung was generally congested; there was a considerable transudation of blood beneath the pleura at its middle and posterior part; its lower lobe contained splenified lobules, black in color, and separated from each other by permeable tissue. The right lung weighed twenty-four ounces and a half, the left twenty-one ounces and a half. A thin fibrinous clot adhered to the anterior wall of the right auricle and extended through the ventricle into the pulmonary artery; the left auricle also contained a fibrinous clot extending into the ventricle and attached to the mitral valve. The fundus of the stomach was of a dull lake-red and the pyloric portion paler; it contained five lumbricoid worms. The liver was soft but of normal color, its capsule easily torn. The spleen was of a mulberry color and moderately firm. The mucous membrane of the jejunum was rather soft and the villi were easily scraped off. The lining membrane of the three feet of the ileum nearest to the ileo-cæcal valve was greatly congested, and Peyer's patches were ulcerated though not perceptibly thickened; the first ulcer was small, superficial and of a darker color than the surrounding membrane; about a foot above the valve a large patch, softened and very hyperæmic but not elevated, presented near its border an ulceration about the size of a pea, with elevated walls and blackened centre. The kidneys were somewhat injected, the cortical substance firm and pale.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 9.—Private William Crigger, Co. E, 20th Ind.; age 19; was admitted Nov. 24, 1864, with bronchitis, from which he recovered and was transferred to Convalescent Barracks Jan. 4, 1865. He was readmitted April 8, with pulse 100 to 110, skin hot and dry, tongue brown-coated with red edges, bowels loose, abdomen tympanitic. Active delirium, subsultus tendinum and pneumonic symptoms appeared on the 13th; after the 15th there was continued insomnia and on the 17th involuntary stools. Profuse sweats and coma ushered in death on the 20th. *Post mortem* examination twelve hours after death: The brain weighed fifty-four ounces; there were six ounces of serum beneath the arachnoid and a large quantity in the lateral ventricles; the cortical portion of the brain was highly congested and the puncta vasculosa prominent. There were pleuritic adhesions on the right side; the lower lobes of the lungs were hepatized. The heart was normal. The spleen was enormously engorged, weight forty-one ounces; liver and kidneys normal; stomach congested in patches; Brünner's glands congested; small intestine congested in lower portion; Peyer's patches near ileo-cæcal valve extensively ulcerated; mesenteric glands greatly enlarged; bladder healthy.—*Hospital, Madison, Ind.*

Case 10.—Private Daniel L. Keeney, Co. C, 140th Pa.; age 24; was admitted July 11, 1863, with a flesh-wound of the right hand, which granulated kindly until the 22d, when small ulcers were noticed on the inside of the cheek and on the tongue, for which a mouth-wash containing sulphate of zinc and tincture of myrrh was prescribed. During the next few days he became weak and languid, complaining on the 29th of some diarrhœa. Small doses of calomel, opium and ipecacuanha were administered, to which, on August 9, a solution of citrate of potassa was added. On the 12th he had slight cough with sonorous and sibilant râles, and there was iliac tenderness. Next day the red spots of enteric fever appeared on the abdomen and chest and the abdomen became tender all over. On the 13th, as the tongue was very dry and the strength failing, the treatment was changed to turpentine emulsion, wine, milk and beef-essence. Occasional delirium followed, and mucous, sonorous and sibilant râles became audible over the right side of the chest. Four dry cups, carbonate of ammonia and raw eggs were ordered. On the 18th increasing diarrhœa was recorded with subsultus tendinum, stupor, difficulty of swallowing and sloughing of the wound in the hand. Death occurred next day. *Post-mortem* examination seventeen hours after death: Abdomen flat; lungs congested, especially the right; heart, liver and kidneys normal; ileum congested, glands of Peyer thickened and near the cæcum ulcerated; jejunum normal. [Specimens 315 and 316, Med. Sect., Army Medical Museum, ulceration of ileum, are from this case.]—*Act. Ass't Surg. W. L. Wells, McClellan Hospital, Philadelphia, Pa.*

Case 11.—Private John H. Winland, Co. D, 116th Ohio; age 23; was admitted Nov. 5, 1864, with typhoid fever. On admission the patient's skin was hot, tongue dry and bowels somewhat loose, tympanitic and tender. He was treated with quinine, oil of turpentine and chalk mixture until the 14th, when he seemed very much exhausted, presenting subsultus tendinum, hurried breathing, anxious countenance and a scarcely perceptible pulse. Under milk-punch, beef-tea and camphor and opium improvement took place; on the 24th the tongue was moist, there was some appetite and no delirium. On December 3 he coughed incessantly and his breathing became hurried. He died on the 6th. *Post-mortem* examination thirteen hours after death: Heart soft and flabby; lungs, spleen, kidneys and stomach healthy; liver much enlarged, weighing five pounds and a quarter; ileum inflamed in nearly its whole length and Peyer's patches ulcerated in fifteen places.—*Act. Ass't Surg. Sample Ford, U. S. A., Cumberland Hospital, Md.*

Case 12.—Private John L. Palmer, 7th Mich. Cav.; age 21; was admitted April 30, 1865, convalescing from measles. On May 22 the nurse reported him as having been ailing for several days; he had headache, flushed cheeks, increased pulse, 90, dry tongue, tympanitic abdomen, pain in right iliac region, a good deal of diarrhœa and some rose-colored spots. Diarrhœa continued troublesome for several days, the pulse becoming more frequent and the teeth covered with sordes; delirium and pneumonic symptoms made their appearance and death occurred June 5. *Post-mortem* examination: The areolar tissue of the front of the neck was œdematous, the epiglottis swollen and the anterior mediastinum filled with lymph and serum. Each pleural sac contained a large quantity of serum; the whole of the right lung and the lower lobe of the left were much congested. The spleen was large; the ileum inflamed and Peyer's patches ulcerated.—*Act. Ass't Surg. H. J. Wiesel, Cumberland Hospital, Md.*

Case 13.—Private William H. Green, Co. I, 161st N. Y., was admitted Nov. 19, 1862, delirious and greatly prostrated from typhoid fever. He had diarrhœa, sordes on the teeth and lips and a well-marked rose-colored eruption.

He was treated with laudanum and brandy, essence of beef and milk. The diarrhœa was checked and the delirium lessened, but the pulse became more frequent and feeble, the prostration increased and the patient died by asthenia on the 25th. *Post-mortem* examination: An abundant typhoid deposit in the glands of Peyer and solitary glands was in process of sloughing; the mesenteric glands were greatly enlarged.—*Ladies' Home Hospital, N. Y. City.*

Case 14.—Sergt. Edwin Avery, Co. I, 161st N. Y., was admitted Nov. 19, 1862, with typhoid fever. He had been slightly sick for five days before admission, his case presenting moderate diarrhœa, meteorism and tenderness in the iliac region, rose-colored spots, much prostration and frequent, feeble pulse, but no delirium—indeed, shortly before death he gave directions with regard to certain family matters. He was treated with anodynes in moderate doses, alcoholic stimulants and a sustaining diet. He died by asthenia December 2. *Post-mortem* examination: An abundant typhoid deposit in the glands of Peyer and solitary glands was in process of sloughing; the corresponding mesenteric glands were greatly enlarged.—*Ladies' Home Hospital, N. Y. City.*

Case 15.—Private John Caillot, Co. L, 4th N. Y. Cav.; age 24; was admitted July 19, 1863, with hot and dry skin, frequent and feeble pulse, diarrhœa, tympanites, abdominal tenderness, taches rouges over chest and abdomen and muttering delirium. He died on the 31st. *Post-mortem* examination eighteen hours after death: Emaciation; abdomen tumid; lower lobe of right lung congested; heart, liver and kidneys healthy; spleen enlarged; greater omentum much injected; mesenteric glands enlarged and inflamed; intestines filled with a liquid resembling pus; mucous membrane of small intestine softened; Peyer's patches thickened and ulcerated.—*Third Division Hospital, Alexandria, Va.*

Case 16.—Private James Beckwith, Co. F, 2d Me.; age 23; was admitted Sept. 6, 1861, with typhoid fever occurring as a relapse. The patient had a full strong pulse, 120, heavily coated and dry tongue, hot and dry skin. One ounce of sulphate of magnesia was ordered. He rested poorly during the night, having had some head symptoms; his bowels were moved twice, although by mistake the Epsom salt had not been taken. His skin at the midnight visit, September 7, was warm and perspiring, tongue dry and brown in the centre, pulse full, 114. Half an ounce of tincture of rhubarb with ten drops of oil of anise was administered, by which the bowels were moved rapidly. In the evening he was unconscious, and during the night delirious with involuntary stools of a brown color. Next day there was rather less fever; pulse 104. Quinine, which had been given the previous day, was continued in eight-grain doses, with whiskey-punch and beef-essence, and an astringent injection at night. His bowels were moved twice on this day, the 8th, and he had tenderness in the right iliac region. During the following night there was walking delirium, and a few minute red spots were discovered, which did not disappear on pressure. At 11 A. M. of the 9th he had a severe congestive chill; during the paroxysm his pulse was strong and rapid; he raved and showed much strength. Morphia was given to quiet him. His bowels were moved involuntarily during the day, and he was very restless, requiring to be held in bed. On the 10th, after a quiet night, he was dull and stupid, his pulse 117, skin hot, face flushed, teeth covered with sordes; in the evening he became drowsy and was quiet during the night. Turpentine emulsion was given. On the 11th his pulse was quick and weak, 130, tongue cracked and protruded with difficulty, stools involuntary, countenance haggard and eyes fixed; he had also subsultus, grinding of the teeth, rose-colored spots and sudamina. In the evening his skin became cool, the prostration increased and the involuntary stools were large and fetid. On the 12th the symptoms were: Pulse 137, soft, small and weak; respiration 14; skin hot and moist; hands and feet cold and clammy; face pale; nose pinched; eyes and mouth half closed; lips livid; nausea; subsultus; black vomiting. He died at 3 P. M. *Post-mortem* examination: The ileum was much thickened, inflamed and ulcerated for five feet above the ileo-cæcal valve; Peyer's glands were elevated, extensively ulcerated and perforated in two places near the valve. No fæcal matter was found in the peritoneal cavity. The stomach was not examined.—*Seminary Hospital, Georgetown, D. C.*

Case 17.—Private James D. Prickett, Co. H, 11th Va.; age 21; was admitted Sept. 19, 1864, with typhoid fever. According to the statement of a comrade this man had been in service about two years, during which he had performed his duties with little interruption from ill health. On admission he was delirious and almost moribund. He had apparently been ptyalised by some preparation of mercury before his arrival. Morphia was ordered for the purpose of procuring rest and sleep. On the 21st his pulse was 110, feeble and thread-like, tongue dry, red and glazed, gums spongy, teeth covered with sordes, breath tainted with the fetor of salivation, abdomen tympanitic and tender, countenance darkly flushed, skin cool and dry; there had been delirium during the night. A hot sponge-bath was ordered, with fomentations to the abdomen, quinine, turpentine emulsion, whiskey-punch and solution of chlorate of potassa as a mouth-wash. Under this treatment the tongue became somewhat moist and the sordes disappeared from the teeth, but the delirium continued through the night with drowsiness during the day. He had epistaxis, partly induced by picking at the nose. On the 25th he seemed slightly improved, but next day persistent vomiting set in with slight hiccough, the abdomen continuing distended and extremely sensitive. He died comatose on the 27th. *Post-mortem* examination seventeen hours after death: Body not much emaciated. There were recent peritoneal adhesions and a large quantity of serum in the abdominal cavity. The intestines were distended with flatus. The mucous membrane of the small intestine was congested and of a dark-red color from the pylorus to the ileo-cæcal valve; the glands of Peyer and the solitary glands were inflamed and ulcerated, and there were several minute perforations. The liver was normal; the spleen slightly enlarged and congested; the kidneys congested and greatly enlarged, the right weighing thirteen, the left ten ounces. The brain, thoracic viscera and colon were not examined. *Act. Ass't Surg. A. W. Holden, Cumberland Hospital, Md.*

Case 18.—Private Abraham Lindsley, Co. E, 15th N. Y. Cav.; age 26; was admitted Sept. 6, 1864, with typhoid fever. This man enlisted in July, 1863, and had good health until March 10 following, when he had an attack of diarrhœa lasting six weeks, for which he was treated in regimental hospital. Exposure in the field during Hunter's raid

through West Virginia brought on a recurrence of his diarrhœa, which continued during the whole of that severe campaign and for three weeks after its termination. While slowly improving in the regimental hospital he accompanied his regiment on a forced march, during which his strength utterly gave way, and he was sent to Hancock, Md., and thence to this hospital. On his arrival his symptoms were those of typhoid fever—pulse rapid and irritable, countenance darkly flushed, skin dry, eyes languid and dull, tongue red and dry, abdomen tender and tympanitic. He had frequent slimy, watery stools, with some tenesmus, and was so weak that he could scarcely speak. Morphia and astringent mixtures, quinine and milk-punch were administered, but without improvement. On the 11th his tongue had become brown and dry, his abdomen extremely sensitive and his stools thin and fetid. On the following night he had some delirium, and next day was drowsy and unconscious most of the time, occasionally picking at the bedclothes and fingering the air. He continued thus for two days, his pulse becoming more rapid and feeble and his tongue swollen, glazed and brown, with red margins. On the 14th there was a slight amelioration of the symptoms, but next day the pulse ran up to 140, the eyes became glassy, the pupils dilated, and death occurred after an interval of deep coma. *Post-mortem* examination seventeen hours and a half after death: Body moderately emaciated. Extensive congestion of the omentum, recent adhesions and other indications of peritonitis were observed. The intestinal mucous membrane was red and injected from the duodenum to the ileo-cæcal valve; Peyer's patches were extensively ulcerated and several of the ulcers had penetrated. The liver and kidneys were pale and fatty; the spleen enlarged and dark colored. The colon was not examined.—*Act. Ass't Surg. A. W. Holden, Cumberland Hospital, Md.*

Case 19.—Private S. C. Cole, Co. F, 77th N. Y.; age 26; was admitted Aug. 1, 1864, with diarrhœa, nausea, vomiting, great prostration, weak voice and feeble pulse, 80, which continued, but with some abatement, until the 10th, when he was seized with a sudden and violent pain in the hypogastric and right iliac regions and became greatly prostrated, the countenance anxious, surface cold and moist, voice coarse and husky, pulse small and increasing in frequency and abdomen hard and tender but not tympanitic. Magendie's solution gave some relief to the pain, but he sank rapidly and died on the 12th. *Post-mortem* examination fourteen hours after death: Peritoneum purple, much congested, unadherent, and cavity containing thirty ounces of a yellow liquid mixed with fæcal matter. Small intestine much congested; ileum within a foot of the ileo-cæcal valve presenting many ulcerations of Peyer's glands, with five circular perforations from three-fourths of an inch to one inch in diameter.—*Surg. Henry K. Steele, 8th Ohio Cav., Hospital, Frederick, Md.*

Case 20.—Private Henry R. Refior, Co. B, 13th Regulars, was admitted on board hospital steamer D. A. January March 17, 1863, at Young's Point, La. On admission he stated that he had been sick for some weeks, and from his description it was evident that he had suffered from a mild attack of typhoid fever. He was convalescing; he slept well and had a good appetite. When about to leave the boat, on March 23, for transfer to the convalescent hospital at Milliken's Bend, he was suddenly attacked by severe pains in the lower part of the abdomen and was at once carried back to bed. He had a pale, anxious countenance and was bathed in a profuse cold perspiration; pulse 90 and feeble. Half a grain of sulphate of morphia was ordered and hot applications to the abdomen. Castor oil was administered and afterwards an enema, but neither relieved the constipation of the bowels. In the evening there was much pain and distention. Sulphate of morphia was given every two hours. He became intensely prostrated and died at midday of the 26th. There was no vomiting in this case. *Post-mortem* examination ten hours after death: Thoracic viscera normal. The peritoneal sac was inflamed and contained a large quantity of greenish fluid; the abdominal viscera were glued to each other by layers of soft coagulated lymph. The mucous membrane of the ileum was in some places injected, and in its lower part near the cæcum were some cicatrized ulcers of Peyer's glands; one ulcerated patch had perforated the coats of the intestine.—*Surg. Alexander H. Hoff, U. S. V., Hospital Steamer D. A. January.*

(B.) Peyer's patches ulcerated and the large intestine also implicated—13 *cases.*

Case 21.—Private Richard Clark, Co. M, 2d Mass. Cav.; age 21; was admitted July 19, 1863, having been sick for an unknown period; tongue dark brown but red along the edges; pulse 130, small; delirium; epistaxis; diarrhœa; abdomen tympanitic and covered with petechiæ. His condition improved under the influence of camphor, valerian, quinine, acetate of ammonia and sponging with alcohol and water, but on the 24th pain was developed in the right lung with dulness and crepitant râles over its lower lobe. Cupping was followed by relief; but his skin continued hot and dry. On August 2 he passed a quart of blood from his bowels and a small quantity on the following day. He died, exhausted, on the 5th. *Post-mortem* examination seven hours after death: Right lung congested throughout; left lung healthy. Stomach bloodless, its coats somewhat thickened and its pyloric orifice contracted; Peyer's patches ulcerated; ileo-cæcal valve extensively ulcerated and disorganized; ascending colon containing a considerable quantity of blood.—*Act. Ass't Surg. T. Turner, Third Division Hospital, Alexandria, Va.*

Case 22.—Private Henry Royer, Co. C, 148th Pa., died June 30, 1863, from an attack of typhoid fever. *Post-mortem* examination twenty-four hours after death: Slight cadaveric rigidity; much bloody froth issuing from the mouth and nostrils. The mucous lining of the stomach was irregularly colored; it was of a slaty hue at the pylorus, mottled reddish and blackish. Beneath the epithelial lining of the duodenum a quantity of gas was found, supposed to be due to putrefactive changes. Below this point the mucous membrane was of a dull whitish color, very inelastic and easily torn. Eight feet from the ileo-cæcal valve Peyer's patches commenced to be involved; at first the upper and lower parts of the patch were swollen, livid, not ulcerated, the centre being natural; lower down some were entirely livid, with no ulceration; about one foot from the valve was one very large patch with thick high walls, ulcerated centre and numerous small ulcerated points in its area. These portions were of a lighter hue than the non-ulcerated portions, but none of them perforated the gut; the largest patches gave the intestine a honey-combed appearance from the peculiarity of the ulceration. The large intestine was of a grayish-slate color, its mucous membrane softened but not ulcerated.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

CASE 23.—Private Dudley Whitlock, Co. E, 5th Mich. Cav.; age 17; was admitted March 25, 1863. On April 1 his condition was noted as follows: Weak; tongue dry and coated; pulse 144, compressible; respiration 66, difficult; bowels regular; skin hot and dry; bed-sores on back and hips; urine passed involuntarily; dulness on percussion over each lung, most marked posteriorly; greatly increased vocal resonance; bronchial respiration; irritable cough. 3d: Pulse 130; respiration 60; sputa somewhat tenacious. 6th: Stronger; profuse semi-purulent discharge from each ear. 7th: Diarrhœa, seven stools; pulse 140; respiration 44; tongue moist. 10th: Diarrhœa continues; he refuses medicine. Body sponged with whiskey; medicine given by enema. 14th: Pulse 158; respiration 24; weak; death. *Post-mortem* examination twenty hours after death: Rigor mortis; emaciation. Brain normal. Trachea and bronchi filled with white viscid sputa; mucous membrane dark purplish; bronchial glands firm, of a dull liver color mottled blackish in centre. Lungs solidified and dark purple posteriorly, reddish anteriorly; minute whitish points in central portions; pleuritic effusion on left side. Heart contained small white clots on both sides. Liver mottled purple and pale yellow, interlobular areas yellowish; twenty-six drachms of dark bile in gall-bladder. Spleen firm, dark mulberry color. Œsophagus pale; mucous membrane of stomach mottled a delicate pink color; deposit of black pigment on pylorus. Small intestine in upper part pale yellowish; duodenum filled with thick stringy mucus; Peyer's patches normal to within eighteen inches of ileo-cæcal valve, where they were thickened, elevated, congested and in many places indurated and ulcerated, the ulcers having well-defined edges and in some instances reddish bases; solitary follicles the size of small shot. Mucous membrane of large intestine pale, rugæ dark red; solitary glands prominent, dotted with pigment in centre; lower portion of intestine presenting many minute superficial ulcers unconnected with solitary glands. Kidneys pale; suprarenal capsules mottled.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

CASE 24.—Private John North, Co. E, 5th Mich. Cav., was admitted March 25, 1863, having been sick for some time in regimental hospital. He was delirious and had high fever, a tremulous full pulse, sordes upon the mouth and teeth, a typhoid fever tongue, some cough and expectoration, pain in the right iliac fossa and diarrhœa, the evacuations soon becoming involuntary and offensive. He died on the 28th. *Post-mortem* examination twelve hours after death: No emaciation; rigor mortis marked; apparent age 21 years. The brain was healthy. The right lung was congested and weighed twenty-five ounces; the left twenty-six ounces, its lower lobe being intensely engorged and in some parts hepatized. The right side of the heart contained a blackish clot of moderate size; the left ventricle a smaller clot. The liver was pale, its acini well defined, its texture softer than usual, its weight seventy-three ounces and a half; the gall-bladder contained five drachms of deep-yellow flaky bile. The spleen was soft, deep purplish-black and weighed eighteen ounces. The pancreas and kidneys were normal. The stomach was red at the fundus. Peyer's patches were indurated, thickened and in many places ulcerated. The solitary glands were so numerous that on a square inch selected at random fifteen were counted; they were large, about two lines in diameter. The mucous membrane of the large intestine was generally mottled red, but in the ascending colon it was of a light slate color mottled with red; the solitary glands in the cæcum were enlarged and several of them ulcerated.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

CASE 25.—Private Edward L. Rice, Co. D, 123d N. Y., was admitted Jan. 11, 1863. During the interval between his admission and his death on the 14th extreme agitation, hurried respiration, delirium and tenderness in the right iliac fossa were noted. *Post-mortem* examination seven hours after death: The lungs were crowded into the upper part of the thorax by the distended intestines; the left lung was slightly congested posteriorly; the upper and middle lobes of the right lung were partially congested and solidified, apparently the result of hypostasis; the blood was fluid. The liver was large and pale; the spleen large, congested and soft; the kidneys pale and exsanguine. The intestines were inflated with gas; the ileum congested; Peyer's patches enlarged and ulcerated, some to a marked degree; the cæcum congested; the mesenteric glands enlarged.—*Surg. H. Bryant, U. S. Vols., Lincoln Hospital, Washington, D. C.*

CASE 26.—Private Jos. McVaugh, Co. D, 147th Pa.; age 45; was admitted July 28, 1863. He was very feeble and delirious, with an inclination to stupor; his tongue very dry and red; skin cool and clammy; pulse 113, small and weak; bowels moved about ten times daily; abdomen hard and tender, especially in the right iliac region. In the progress of the case the stools became less frequent, but all the other symptoms increased in severity; the passages during the night before death were involuntary. He died August 2. *Post-mortem* examination seven hours after death: The brain weighed forty-five ounces; the pia mater was somewhat congested and the choroid plexuses filled with minute air-bubbles. The trachea was greenish but contained healthy sputa; the mucous membrane of the œsophagus was pale, yellow-stained near the cardiac orifice and presented numerous whitish points. The right lung weighed eleven ounces and was slightly engorged in its upper and middle lobes. The left lung weighed fifteen ounces; its upper lobe was much shrunken and contained but little air; towards its apex was a small circular elevation about the size of a chestnut, surrounded by a livid purplish zone about three inches in diameter; on opening this spot a quantity of air escaped and a few drops of bloody fluid; the lower lobe was engorged with venous blood. The heart contained a small fibrinous clot in the right cavities and a mixed clot in the left; the pericardium contained two drachms of bloody fluid. The stomach was unusually firm and its mucous membrane pale-red in color throughout. The liver weighed fifty-three ounces and was slightly congested; the gall-bladder contained ten ounces of bile of a brownish-ochre color, filled with a flaky substance which did not precipitate. The spleen weighed five ounces and was flabby, soft and of a mulberry color. The right kidney weighed five ounces; its external surface was of a bluish color spotted with numerous dark-blue points; an abscess about the size of a horse chestnut, with ecchymosed walls, containing discolored pus, was found on the anterior surface near the outer margin. The left kidney weighed five ounces and a half; it was much congested; a small cyst containing serum was found on its anterior surface. The small intestine was healthy to within three feet of the ileo-cæcal valve, but from this point downward the mucous membrane was of a reddish-purple color, thin and somewhat softened; Peyer's patches were

discolored and ulcerated, especially near the valve, where patches of a dark-blue stone color, fully an inch in diameter, were eroded. The large intestine was greenish but free from ulceration; the solitary glands were white and conspicuous.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 27.—Private Martin Burnes, Co. G, 164th N. Y.; age 20; admitted July 17, 1865, having been sick about three weeks without medical attendance. Low delirium set in on the 19th; diarrhœa, which was troublesome at first, subsided by the 21st. On the 23d blood to the amount of two pints was passed from the bowels, and he died exhausted four hours thereafter. *Post-mortem* examination nine hours after death: The intestines were half filled with a frothy, semi-fluid, bloody mass; Peyer's patches were ulcerated into deep excavations bounded by thickened and indurated edges; the solitary follicles were ulcerated throughout both small and large intestines; many of the ulcers penetrated to the peritoneum. The spleen was enlarged and softened; the other organs normal.—*Act. Ass't Surg. George P. Hanawalt, Douglas Hospital, Washington, D. C.*

Case 28.—Private Castor Seebold, Co. E, 51st Pa.; age 19; was admitted May 7, 1864, presenting some emaciation, dry tongue, sordes on teeth, tenderness in right iliac fossa, and restlessness, with a frequent pulse, 120. Next day rose-colored spots were observed, and he had epistaxis and diarrhœa, with a more rapid pulse. He was treated with acetate of ammonia and morphia, milk-punch, eggnog and beef-tea. He died on the 11th. *Post-mortem* examination four hours after death: Lungs congested; heart, liver and kidneys healthy; spleen somewhat softened and congested; ileum and cæcum very much congested; Peyer's patches and the solitary glands in the ileum much enlarged and ulcerated.—*Turner's Lane Hospital, Philadelphia, Pa.*

Case 29.—Corporal J. B. Richardson, Co. E, 2d Mich.; age 26; admitted Feb. 8, 1863, having been affected for two weeks with anorexia, tympanites, diarrhœa and cough, and presenting a hot and dry skin, furred tongue and injected eyes; delirium and involuntary stools occurred on the 11th, and death took place on the 17th. *Post-mortem* examination: The brain was normal. The bronchial tubes on both sides presented indications of inflammation, and the lower lobes of the lungs contained hepatizations from the size of a chestnut to that of a hen's egg. The liver and spleen were large but unaltered in texture; the gall-bladder was small and half full of dark bile; the kidneys healthy; the pancreas enlarged and somewhat hardened. The mesenteric glands were enlarged and indurated; the mucous membrane of the stomach much injected; the duodenum and jejunum inflamed in patches; the ileum congested, thickened and softened, and its agminated glands ulcerated, the ulcers having thick, hard, prominent edges. The colon was inflamed in patches and its mucous membrane thickened.—*Harewood Hospital, Washington, D. C.*

Case 30.—Private Edgar Sanborn, Co. D, 6th N. H.; age 15; was admitted July 24, 1864, with feeble and frequent pulse, great heat of body, dry brown tongue, sordes on teeth, slight diarrhœa and great tenderness in the right iliac region. On the 28th his face became dusky and stupor supervened. He died on the 30th. *Post-mortem* examination: Much bronchial secretion; lungs congested; heart and liver normal; lower half of ileum slightly inflamed, with commencing ulceration of Peyer's glands and cicatrices of old ulcers; cæcum presenting two ulcerations; rectum much inflamed.—*Act. Ass't Surg. A. H. Haven, Fairfax Seminary, Va.*

Case 31.—Private Oscar Snow, Co. H, 3d Vt.; age 20; was admitted Oct. 1, 1861, with typhoid fever. He had been sick a week, but he was so dull that he could give but little information concerning the early part of his sickness. A bath was ordered for him, and Dover's powder at night. Next day his face was flushed, pulse 135, full, skin hot and dry, tongue slightly moist but thickly coated brown; he had slight delirium, some deafness and ten or twelve characteristic rose-colored spots; his bowels were loose, tender and tympanitic. From this time the condition of the patient gradually changed for the worse. His bowels for some time were not loose, but tenderness, meteorism and borborygmus were present throughout; on October 12 he had three involuntary passages. His pulse, which at first was rapid and full, lost its fulness but retained its rapidity, becoming small, weak and fluctuating. His tongue became dry, and on the 9th he was unable to protrude it; on the same day sordes appeared on the teeth. The rose-colored spots disappeared on the 11th. From being somewhat dull mentally, with occasional mild delirium, he fell into a prostrate condition, lying on his back with his lower jaw dropped and his eyes open, taking no notice of anything going on around. On the 8th his breathing became hurried; mucous and sibilant râles were heard in the right lung, and on the 12th a leathery creaking sound was distinguished over both lungs. On the 11th the parotid gland was found to be swollen. The treatment consisted of quinine, turpentine, brown mixture, nourishment and stimulants. On the evening of the 13th his face was ashen-gray in color, lips cold and bloodless, head and extremities cold; there was some deafness and it was very difficult to arouse him; he had also a mild delirium, speaking of going home, and had no idea of his condition. His pulse, about 140, was weak and barely perceptible at the wrist; the superficial circulation was almost suspended—an impression made with the fingers remained a long time. He had no hemorrhage from the nose or bowels; his bowels moved occasionally involuntarily, the passages being very thin; the abdomen was acutely tender and borborygmus frequent. His respiration varied from fifty to sixty per minute; a rattling sound was heard in the throat during expiration, as though from mucus which he had not strength enough to eject; his breath was very offensive for the first time since his illness. His urine, acid and albuminous, had a specific gravity of 1011, and contained mucus, epithelium, urates and a few blood-discs. The parotid gland continued much swollen. On the evening of the 14th he aroused himself and spoke very rationally; his eyes shone brilliantly for a few minutes; he tried to rise from bed, but fell back from weakness; the rattling sound in the bronchial tubes increased, and after a few deep-drawn breaths he was dead. *Post-mortem* examination fourteen hours after death: Side of face swollen; parotid infiltrated with pus. The pleural cavities contained a number of large blood-clots; the derivation of the hemorrhage was not ascertained. The lungs were congested, but were not closely examined for want of time. The stomach contained a pint of very offensive yellowish matter; its mucous membrane was thick and congested. The liver and gall-bladder were enlarged but healthy; the spleen and

kidneys enlarged and congested. The peritoneum was much inflamed. The glands of Peyer and the solitary glands of the ileum were much ulcerated. A foot and a half from the ileo-cæcal valve the ileum presented a diverticulum about four inches long, as wide as the gut from which it was derived, and like it, blackened and much ulcerated. The mesenteric glands were enlarged, the mesentery much congested and inflamed. The mucous membrane of the colon was dark in color but not ulcerated.—*Seminary Hospital, Georgetown, D. C.*

Case 32.—Private Christian Schultz, Co. K, 14th Conn.; age 42; was admitted Dec. 16, 1862, having been sick for two or three months with rheumatism. He complained only of pains in his back and limbs until Jan. 1, 1863, when he was taken with headache, trembling, a full compressible pulse and other manifestations of nervous derangement; his tongue was moist and coated with a white fur. He was ordered a teaspoonful of castor oil, which operated six times in the twenty-four hours. No noticeable change occurred until the 6th, when some tympanites was observed and one tache rouge close to the umbilicus. On the 9th the pulse became small and compressible, the tongue dry, the face flushed and the diarrhœa persistent, while an increasing tendency to drowsiness was manifest. Ten days later the diarrhœa became checked and the tongue dry, raw and cracked; he had herpetic eruptions on the lower lip, a troublesome cough, and was so much prostrated as to slide down in bed. On the 21st his bowels were moved in hard masses after an interval of forty-eight hours; next day his pulse was stronger, tongue cleaning and more moist and skin clammy, but the cough persisted and was distressing. On the 30th he was considered convalescent, and his case, with careful attention to diet, progressed favorably until February 25, when there occurred unmistakable evidence of a relapse. On March 3 the patient presented the taches rouges, and was affected with dulness of hearing, epistaxis, tympanites and diarrhœa; on the 8th he vomited matter which looked like altered blood, and complained of pain in the left hypochondrium. During the next few days the vomiting continued and a cough with bloody sputa was developed. On the 14th the respirations were 56 per minute and the pulse frequent and feeble. He died on the 20th. *Post-mortem* examination: The mucous membrane of the trachea and bronchial tubes was inflamed; the bronchial tubes were filled with muco-purulent matter. In the right lung were several hepatized nodules the size of walnuts, the surfaces of which were attached by recent pseudo-membrane to the costal pleura; the left pleural sac contained about two quarts of yellow serum mingled with pus and thin jelly-like fibrinous coagula. The heart was filled with black and white clots. Peyer's glands were thickened and a number of them ulcerated, three of the latter having perforated; but there was no evidence of peritonitis. The cæcum was moderately inflamed and presented a number of small ulcers; the colon showed a few streaks of inflammation. There was intralobular congestion of the liver. The spleen was soft.—*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia.*

Case 33.—Sergt. Gustave Van Ecken, Co. F, Independent battalion, N. Y.; age 30; was admitted from Beaufort, S. C., with typhoid fever: Prostration, pulse 120, tongue dry and brown, sordes, diarrhœa, red eruption, delirium, and, forty-eight hours before death, tympanites. *Post-mortem* examination eighteen hours after death: Peyer's patches extensively ulcerated; mucous membrane of large intestine ulcerated; cæcum perforated at two points; abdominal cavity containing a large quantity of fæcal matter and showing but slight evidences of peritonitis; kidneys fatty; spleen enlarged.—*Act. Ass't Surg. S. Teats, Central Park Hospital, N. Y. City.*

(C.) Condition of Peyer's patches not stated; ileum or small intestine ulcerated—13 cases.

Case 34.—Private Benjamin Cunningham, Co. D, 86th N. Y.; age 21; was admitted Feb. 18, 1862, having been sick for some time with chills, headache, pains in back and limbs, loss of appetite, epistaxis, diarrhœa and inability to sleep. On March 4 his pulse was recorded as rapid and weak, skin warm and moist, cheeks flushed, tongue smooth and natural, abdomen tympanitic and covered with vibices and a few sudamina; he had little appetite, great thirst and one or two watery and sometimes involuntary passages; he was somewhat deaf but appeared sensible; respiration was hurried and there was some cough. Treatment: Punch, beef-essence, turpentine emulsion and tincture of iron, with mustard to the abdomen. From this time he improved: His watery passages gave place to more natural and regular discharges,—indeed, on the 10th his bowels were noted as rather constipated, he slept well, his appetite returned and his general appearance and strength seemed improving; but his tongue was considered to be too smooth, and at times his mind did not appear to be clear. He was, however, considered as in a fair way to recovery. On the 15th he complained that his hips were sore from long continued pressure, and next day that he had lost the sense of taste—that he could feel his food when in his mouth but could not taste it. Bed-sores over the sacrum were noted on the 17th, and great debility with enlarging sores over the left trochanter on the 26th, on which day also he was seized with a severe pain in the left side. This pain increased on the 27th, the breathing becoming hurried and prostration extreme; his mind was clear, pupils dilated, the sclerotic showing to an unnatural extent. He died on the 29th, diarrhœa returning a few hours before death. *Post-mortem* examination: The mucous membrane of the ileum was much inflamed and ulcerated eighteen or twenty inches above the ileo-cæcal valve.—*Seminary Hospital, Georgetown, D. C.*

Case 35.—Private Jacob Davis, Co. I, 63d Pa.; age 21; was admitted Oct. 10, 1863, with emaciation, debility and diarrhœa, a dry, brown tongue, cracked in centre, teeth covered with sordes, respiration quick and feeble and pulse over 90. He lingered without much change until the 18th, when he died. He was given concentrated nourishment and stimulants, sweet spirit of nitre and turpentine emulsion, with nitrate of silver and opium for the diarrhœa. *Post-mortem* examination six hours after death: The small intestine was considerably congested and for several feet was patched with ulcerations, some of which were as large as a quarter dollar; spleen somewhat enlarged. Other organs healthy.—*Act. Ass't Surg. J. E. Smith, Fairfax Seminary, Va.*

Case 36.—Private Albert Tucker, Co. A, 23d Ohio; age 30; was admitted Oct. 18, 1864, as a convalescent from typhoid fever. He looked pale and weak, had little appetite, but was in good spirits and able to walk about the ward. He had from six to ten stools daily, which were occasionally streaked with blood; his lower extremities were

œdematous and there was some slight abdominal effusion; he had a slight cough, and the heart-sounds seemed distant and masked. Astringents, anodynes and diuretics were employed. He died rather suddenly on the 24th after an attack of dyspnœa and severe præcordial pain. *Post-mortem* examination: Head and upper part of body ecchymosed; lower extremities œdematous; brain normal; thoracic cavity containing a pint and a half of serum; lungs congested and lymph-coated posteriorly; pericardium containing considerable effusion; tricuspid valve apparently thickened; omentum almost devoid of fat; liver and stomach healthy; spleen somewhat enlarged; mesenteric glands enlarged; small intestine presenting many and large ulcerations, especially near the ileo-cæcal valve; kidneys very much enlarged but apparently normal in structure.—*Cuyler Hospital, Philadelphia, Pa.*

Case 37.—Private William H. Harrison, Co. B, 11th Ohio; age 19; was admitted June 22, 1864, presenting a rapid pulse, dry, furred tongue, anorexia, thirst, abdominal tenderness, diarrhœa, restlessness, delirium and the typhoid rose-rash. These symptoms continued, varying in intensity from day to day, until July 2, when they assumed so aggravated a form as to leave no hope of recovery. He died on the 4th. *Post-mortem* examination eight hours after death: Body emaciated; blood oozing from right ear; right lung firmly adherent to costal pleura, its upper lobe congested; spleen three times the usual size; liver enlarged, its right lobe congested; left kidney twice the normal size, its calyx enlarged; lower part of ileum ulcerated, in some places through to its serous coat; mesenteric glands enlarged and inflamed.—*Act. Ass't Surg. C. E. Boyle, Seminary Hospital, Columbus, Ohio.*

Case 38.—Private Daniel Dewey, Co. E, 196th Ohio; age 23; was admitted April 5, 1865, in a very feeble and emaciated condition: Skin dry and husky, neck and breast covered with sudamina, right elbow and knee joints swollen and very painful, tongue dry and cracked, teeth, lips and gums covered with sordes; he had diarrhœa and a hoarse cough, with difficult respiration but not much expectoration. He died on the 22d. *Post-mortem* examination ten hours after death: Body extremely emaciated. Small deposits of pus were found between the fibres of the pectoralis major of the right side. The epiglottis was œdematous and ulcerated; the vocal cords ulcerated; the mucous membrane of the larynx, trachea and bronchial tubes intensely inflamed; the left lung hepatized; the apex of the right lung engorged and infiltrated with sero-purulent matter. The liver was large, pale and soft; the spleen enlarged and much engorged; the ileum inflamed and ulcerated. There was a large deposit of pus in the cavity of the right knee joint and an effusion of serum in the surrounding parts. The left wrist joint and the right elbow joint also contained pus.—*Act. Ass't Surg. S. B. West, Cumberland Hospital, Md.*

Case 39.—Private Franklin D. Hicks, Co. K, 157th N. Y., was admitted Nov. 18, 1862, with typhoid fever. The rose-colored spots were very distinct and the sudamina abundant. He died on the 29th. *Post-mortem* examination forty-eight hours after death: In the lower portion of the small intestine the peritoneal coat was much injected and readily peeled off, and the mucous membrane was extensively softened and ulcerated. The mesentery was considerably injected and the mesenteric glands much enlarged.—*Third Division Hospital, Alexandria, Va.*

Case 40.—Private Josiah Cheever, Co. B, 15th Vt., was admitted April 14, 1863: Headache; occasional delirium; pulse 100, compressible; hot and dry skin; six to eight stools daily; short, dry cough; sibilant rhonchus distinct over chest anteriorly; abdomen tympanitic. Calomel, opium and ipecacuanha in small doses alternating with effervescing mixture ameliorated his condition. The chest and head symptoms subsided, but the abdomen remained distended and tender and the diarrhœa continued. On the 22d his tongue became cracked and pulse feeble, 120. He died on the 28th, notwithstanding the administration of turpentine, alcoholic stimulants and ammonia. *Post-mortem* examination: Thoracic viscera normal. Mucous membrane of small intestine injected, lower ileum presenting eight large ulcers; corresponding mesenteric glands enlarged.—*Third Division Hospital, Alexandria, Va.*

Case 41.—Private Benjamin Tice, Co. E, 13th N. J.; age 24; was admitted Oct. 29, 1862, with diarrhœa, iliac tenderness, nervous disorder and four taches rouges; the skin was hot and dry, pulse frequent but not very feeble, tongue coated with dark fur; there was also a slight cough, accompanied by very little pain in the chest but with most distressing dyspnœa and almost complete aphonia; the chest was resonant on percussion. Small doses of blue mass, opium and ipecacuanha seemed to relieve the chest symptoms and check the diarrhœa. Later, dulness on percussion was noted over the lower portion of the right lung. Dry cups were applied and stimulants administered. After this the pulse became more frequent and feeble, the tongue fissured, the teeth and gums covered with sordes, diarrhœa profuse and tympanites extreme. He died November 6. *Post-mortem* examination: The heart was healthy; the left lung extensively congested; the middle and lower lobes of the right lung hepatized. The omentum was engorged with dark blood; the liver and spleen enlarged; the mucous membrane of the stomach slightly reddened; the duodenal glands much enlarged; the lower part of the ileum ulcerated in eight large patches. The large intestine was not examined. The kidneys were healthy.—*Third Division Hospital, Alexandria, Va.*

Case 42.—Private Martin V. Murphy, Co. F, 123d Ohio, was admitted May 4, 1864, from hospital, Alexandria, Va. He had no hereditary tendency to disease and enjoyed excellent health up to fourteen months ago, when he was seized with a cold while on a scout at Winchester, Va., which in a few days was followed by fever. This confined him to bed for six or seven weeks, after which he partially recovered and went home on furlough, where he had a relapse which disabled him for four or five weeks. He so far recovered from this as to be able to walk several miles and continued to improve for two months, when he was taken with dysentery, which lasted two or three weeks, and since that time he has not fully regained his strength. He returned to his regiment and remained with it for about four weeks while it was in camp at Brandy Station, Va., but during that time he was unfit for duty. When the army moved he was sent to hospital at Alexandria, where he remained a month, after which he was transferred, as above stated. When admitted he was suffering from debility consequent on typhoid fever and dysentery. He was put on tonics and astringents, with the best diet the hospital afforded. He improved gradually until the 14th, when he complained of a sharp pain in the lower part of the right breast, aggravated by deep inspiration and coughing; pulse

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120 and small; tongue moist and red; cough with white frothy expectoration; decubitus on left side; skin very hot. This pleuritic attack lasted until the 25th, after which convalescence progressed satisfactorily until July 11, when he complained of diarrhœa with some tenesmus, which steadily increased, resisting all efforts for its relief. He died July 25th. *Post-mortem* examination sixteen hours after death: Body much emaciated. A large amount of serum was found beneath the dura mater, between the layers of the arachnoid and in the ventricles; the substance of the brain was soft. The right pleural cavity was filled with purulent serum and the pulmonary and costal pleuræ were completely lined with a fibro-albuminous deposit; the lung was consolidated by pressure and bound to the posterior wall of the chest; both lungs were tuberculous; one tubercular ulcer in the right lung had perforated the pulmonary pleura. Tubercles were diffused over the surface of the heart and pericardium. The liver was healthy; spleen small and hard; kidneys small in size but healthy in appearance. Ulcers, with their long diameters at right angles to the length of the gut, were found throughout the small intestine.—*Act. Ass't Surg. Charles P. Tutt, Satterlee Hospital, Philadelphia, Pa.*

Case 43.—Private E. J. Williamson, Co. C, 179th N. Y.; age 20; was admitted Nov. 30, 1864, having been sick for about twelve months. His tongue was dry, dark and cracked and had a glazed edge; teeth covered with sordes; abdomen tympanitic and tender; bowels loose. There was no rose-colored eruption and but little cerebral excitement. Turpentine emulsion and wine were given, and the case progressed favorably until December 3, when pneumonia set in. Next day the pulse was 120, the delirium marked, cough harassing and expectoration scanty. He died on the 5th. *Post-mortem* examination: Ulceration of the ileum, especially about the ileo-cæcal valve. Posterior portions of both lungs hepatized. [*Specimen* 452, Med. Sect., Army Medical Museum, from this case, shows perforation and peritonitis to have existed.]—*Act. Ass't Surg. W. C. Minor, Third Division Hospital, Alexandria, Va.*

Case 44.—Private William F. Hart, Co. A, 14th U. S. Inf., was admitted Aug. 14, 1863, with such symptoms of typhoid fever as a dry and cracked tongue, sordes on teeth, small, weak and rapid pulse, quiet delirium and tympanites. Abdominal tenderness became aggravated and he died on the 16th. *Post-mortem* examination: Perforation of the lower ileum; firm adhesions of intestines.—*Third Division Hospital, Alexandria, Va.*

Case 45.—Private Silas Tomlinson, Co. K, 24th Mich., was admitted Nov. 30, 1864. The patient had been sick for some time in hospital at City Point, Va.; he suffered much and received but little attention during his journey to Alexandria. On admission: Pulse weak, thread-like and from 90 to 100 per minute; skin hot and dry; tongue very dry, red and slightly coated; thirst urgent; appetite small; epistaxis; deafness; expression stupid; delirium; abdomen generally tender, tympanitic and showing a few sudamina and many petechial spots. December 1: No change. 2d: Pulse somewhat stronger, fuller and less frequent; tongue less dry; expression of countenance brighter and hearing improved; diarrhœa less active, but tenderness and tympanites of the abdomen unchanged. 3d: Pulse 80 and decidedly stronger; diarrhœa checked; tongue throwing off its fur; appetite improved; patient intelligent. 4th: The favorable symptoms continued; tenderness of the abdomen lessened. 5th: At 2 A. M. a change for the worse took place; the pulse became weak and ran up to 100; the patient had slight chills; his tongue became dry and red and sordes gathered on his teeth, gums and lips, while the whole surface was bathed in a cold clammy sweat; petechial spots assumed the appearance of purplish blotches, and the abdomen became exceedingly tender, swollen and tympanitic. Ten hours after this change took place the patient had several involuntary stools of a dark-greenish color, after which he fell into a semi-stupor from which he could with difficulty be aroused, and when aroused gave imperfect answers to questions proposed; his face was sunken and there was much twitching of the muscles of the upper extremities. He died on this day. *Post-mortem* examination twenty-three hours after death: A few purple-colored points, said to be of ante-mortem formation, were noticed on the chest and abdomen; there was also purple hypostasis of the posterior part of the body. There was a quantity of fluid under the arachnoid at the vertex of the brain, but the substance of the brain was normal. The heart was dilated on its right side and almost completely filled by a large semi-transparent clot. The left lung was crepitant, although somewhat dark colored posteriorly. The right lung was closely adherent by firm tissue and apparently compressed or drawn over to the right side; the posterior part of its upper lobe was of a dark brown-red color, softened and with minute points, apparently bronchi, filled with a yellow froth; the remainder of the lung was normal. The liver was large and of a uniformly pale clay color; the spleen large and softened; the cortical part of the left kidney of a yellow, semi-fatty appearance. About twelve inches from the colon the small intestine was perforated by a black-margined aperture the size of a small shot; recent lymph glued the perforated coil of the ileum to the bladder and sigmoid flexure. Liquid fæces of a yellow color had to a small extent escaped into the pelvic cavity.—*Act. Ass't Surg. W. C. Minor, General Hospital, Alexandria, Va.*

Case 46.—Private Thomas Williams, Co. H, 8th Md.; age 32; was taken with fever at Camp Bradford (straggler's camp) Aug. 1, 1863. He was admitted on the 13th: Countenance heavy; face flushed; skin hot; pulse about 100; respiration difficult; diarrhœa with ochre-colored passages; urine scanty and high-colored. Treatment: Acetate of ammonia, camphor and quinine, with opiate enemata. On the 15th he was restless and had considerable subsultus; the tongue was protruded with difficulty; respiration was accelerated; much viscid mucus was brought up; auscultation revealed bronchial breathing, and the right lung was dull on percussion. Extract of valerian, sweet spirit of nitre and carbonate of ammonia were administered and turpentine stupes applied to the chest. On the 19th he was greatly depressed, the diarrhœa frequent and exhausting. Carbonate of ammonia in two-grain doses was given every two hours. Next day the pneumonic symptoms were unchanged, the sputa adhesive and tinged with blood. A blister was applied to the chest. Both iliac regions were tympanitic and tender. On the 21st the patient's extremities were cold. Brandy was substituted for milk-punch, which had been given freely since the 18th. On the 23d his mind was clearer than at any time since his entrance. At 8 A. M. of the following day he was seized with violent pain and tenderness in the abdomen followed by persistent vomiting. He died on the 25th. *Post-mortem* examination

shortly after death: The peritoneum showed marks of extensive inflammation and contained about eight ounces of liquid matter similar in character to the dejections during life. The mesenteric glands were enlarged and the ileum, for the distance of three feet above the ileo-cæcal valve, was inflamed and ulcerated; a large perforation was situated fourteen inches above the cæcum. The thoracic and cranial cavities were not opened.—*Med. Cadet W. L. Bradley, McKim's Mansion, Baltimore, Md.*

(D.) Condition of Peyer's patches not stated; ileum or small intestine ulcerated and large intestine affected—4 cases.

Case 47.—Private Elias Brink, Co. B, 137th N. Y.; age 53; was admitted Jan. 18, 1863, having been sick two weeks. He spoke of having hurt his back and ruptured himself by a fall while on the march, and complained of pain in his back. Symptoms of what was supposed to be pericarditis made their appearance on February 7, and next day veratrum viride was prescribed. On the 11th he was noticed to be very deaf; his pulse was slow and weak, and vomiting had set in. The veratrum viride was discontinued. Next day he lapsed into stupor and when aroused with difficulty from this state his answers were incoherent; his breathing was rapid. On the 14th an eruption like that of typhoid fever made its appearance on his body and extremities; he coughed much and muttered to himself; there appeared to be some iliac tenderness; his urine required to be drawn off by catheter. Next day his evacuations became involuntary. He died on the 19th. *Post-mortem* examination four hours after death: Body emaciated; rigor mortis marked. The brain weighed forty-six ounces; it was light-colored, of firm consistence and contained much fluid in its ventricles. The heart was healthy. The right lung weighed fifteen ounces, the left thirteen ounces; the right was full of blood, the upper lobe being somewhat congested and the lower universally so; the upper lobe of the left lung was congested; collapsed lobules were observed in the lower lobes of both lungs; the bronchial tubes were congested and some of the smaller ones contained pus. The liver weighed fifty-four ounces and was universally congested; the gall-bladder contained eleven drachms of dark-green bile; the spleen weighed five ounces and a half and was of a dark-slate color externally, dark-red internally and moderately firm in consistence; the kidneys weighed four ounces and a half each and were of a rather dark color; the stomach was slightly congested. The mucous membrane of the small intestine was softened, especially near the ileo-cæcal valve; it was slightly congested in the jejunum and upper third of the ileum, decidedly so in the lower two-thirds of the ileum, where a number of ulcers were observed. The cæcum was of a dark-slate color; the rest of the large intestine was normal. The mesenteric and mesocolic glands were enlarged, especially the latter.—*Ass't Surg. George M. McGill, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 48.—Private William Duryea, Co. I, 109th N. Y.; age 21; was admitted May 14, 1864, with a gunshot flesh wound of the left forearm, which healed kindly. On the 18th he was furloughed for thirty days, and on his return, June 18, he was placed on light hospital duty, his wound unfitting him as yet for active service. On July 28 he was taken with headache and nocturnal delirium; his pulse 100 and his tongue coated with a dark fur. A few days later some difficulty of breathing was noted, with slight diarrhœa and twitchings of the tendons, the delirium having meanwhile become constant. His condition remained unchanged, but for progressive weakness, until August 7, when he died. *Post-mortem* examination six hours after death: The lungs were congested. The heart was pale and contained no clots. The liver was of normal size but congested; the gall-bladder filled with viscid bile; the spleen dark-colored, slightly enlarged and congested; the kidneys normal. The mucous membrane of the stomach was light-colored, thickened and softened. The lining membrane of the small intestine was soft and somewhat thickened down to the lower portion of the ileum, in which there were large ulcers at different points some distance from each other; near the ileo-cæcal valve it was greatly thickened and congested, and presented very large ulcers surrounded by red areolæ and penetrating to the muscular coat. The mucous membrane of the large intestine was greatly congested and its solitary follicles slightly enlarged. The mesenteric glands were enlarged. [*Specimen* 352, Med. Sect., Army Medical Museum, ulceration of ileum, was obtained from this case.]—*Act. Ass't Surg. O. P. Sweet, Carver Hospital, Washington, D. C.*

Case 49.—Private Hannibal Tichout, Co. H, 2d U. S. Sharpshooters; age 20; was admitted Sept. 16, 1863, having been sick for eight weeks with typhoid fever. His features were sunken, conjunctivæ congested, cornea ulcerated, lips dry and coated with sordes, pulse feeble, 120, and bowels loose; petechial spots on chest and thighs. He sank gradually, dying on the 26th. Treatment consisted of lead and opium for the diarrhœa and of quinine, wine and beef-tea. *Post-mortem* examination twelve hours after death: Extensive peritoneal inflammation and ulceration of ileum and cæcum.—*Act. Ass't Surg. John Flickinger, First Division Hospital, Alexandria, Va.*

Case 50.—Lieut. J. W. Lowe, Co. B, 9th N. Y. Cav., was admitted Sept. 21, 1863, with his neck somewhat swollen and stiff, the result of a blow from a rebel musket at Brandy Station, Va., Aug. 1, 1863; his general health was good. On the 30th he went home on leave of absence. He returned November 14 much improved, stating that during his absence he had an attack of diarrhœa which lasted only a few days; the attack was preceded by vomiting, and was attributed by him to some error of diet. He felt well and expressed himself as able to join his regiment. But at midnight of the 18th the officer of the day was called to see him as he had been seized with a violent pain in the testicle, without swelling but with great tenderness. An anodyne lotion relieved him and he fell asleep, but awoke about daylight vomiting a pale-green liquid and with great tenderness over the stomach. The abdomen soon became tympanitic, the pulse sank, the vomiting became constant and the countenance livid and anxious. A blister was applied and laudanum given by injection. At noon the vomiting became less frequent and he was able to swallow small quantities of brandy and water with morphia; the pulse, however, was scarcely perceptible and the face and hands were covered with cold sweat. He died at 3.30 P. M. after vomiting as much of a pea-green liquid as half filled a common tin basin. *Post-mortem* examination: The thoracic viscera were healthy. The peritoneal cavity contained two ounces of pus. The whole intestinal canal was in a state of acute inflammation; the ileum was perforated in several places, some of the openings being large enough to admit the end of the little

finger. The inflammatory condition extended to all the abdominal viscera. "How this state of things existed without symptoms for a longer period than fifteen hours I am at a loss to explain or even conjecture. The man was not emaciated: on the contrary he had gained in flesh during his visit home. I am informed by his brother, who came for his remains, that he had complained at times of a pain in the bowels, but of so slight a character as not to attract much attention and which was usually relieved by a draught of warm ginger-tea." [Specimen 77, Med. Sect., Army Medical Museum, showing typhoid ulceration and perforation, is from this case.]—*Asst. H. W. Comstock, U. S. V., Seminary Hospital, Georgetown, D. C.*

CASES ENTERED AS TYPHO-MALARIAL WITH OR WITHOUT A RECORD OF SYMPTOMS TO SUBSTANTIATE THE DIAGNOSIS—42 CASES.

(A.) Peyer's patches ulcerated and the ileum or small intestine only affected—14 cases.

CASE 51.—Corporal E. J. Innes, Co. L, 6th Mich. Cav., was admitted July 28, 1863. Diagnosis—typho-malarial fever. On admission he had diarrhœa, debility and slight fever, which was rather remittent in character at first, but became typhoid on August 7. Quinine was given and the diarrhœa was controlled by Dover's powder, lead, tannin and opium: but the prostration increased and a few rose-colored spots appeared on the abdomen. Death took place on the 10th. *Post-mortem* examination: Lungs congested: liver enlarged and softened: Peyer's patches inflamed, thickened and elevated but very little ulcerated.—*Act. Asst. Surg. J. P. Williams, St. Aloysius Hospital, Washington, D. C.*

CASE 52.—Private Byron C. Crane, 18th N. Y. Independent Battery, was admitted Sept. 22, 1864, from Washington street prison. Diagnosis—typho-malarial fever. He had high fever with daily exacerbations followed by sweating: his tongue was thickly coated and there was much cerebral excitement, with swellings of the hands and fingers and numbness of the feet and legs. Quinine was given freely and Mindererus' spirit every six hours. On the 26th there was profuse and almost constant sweating, with hot skin, little appetite, increased hæmorrhages, restlessness and but little sleep. Milk-punch was ordered and the acetate of ammonia omitted. The sleeplessness continued until the 30th, on which date constipation was noted. Active delirium set in next day with much jactitation, and continued until death on October 4. *Post-mortem* examination twenty-four hours after death: small intestine in patches inflamed and Peyer's patches deeply ulcerated: spleen very dark: liver normal: kidneys much congested: lungs normal: pericardium injected and containing an increased quantity of fluid. Other viscera not examined.—*Third Division Hospital, Alexandria, Va.*

CASE 53.—Private Henry Williams, Co. D, 141st N. Y.: age 44: was admitted July 28, 1863, having been sick for about a week with fever of a typhoid type. Diagnosis—typho-malarial fever. On admission he had a pale moist tongue, a frequent and feeble pulse, much prostration, abdominal tenderness and slight diarrhœa. Morning remissions were noted on July 31, August 1, 2, 4, 10 and 12, on which days he was treated with from ten to thirty grains of quinine daily—on the other days opiates and aromatic sulphuric acid were given. The diarrhœa increased to six or seven watery stools daily: râles were heard in the lower lobes of the lungs on the 5th, and the parotids became swollen on the 10th. He became dull and drowsy on the 12th, and died next day. *Post-mortem* examination: Pneumonia of lower lobes of lungs: follicular inflammation and softening of mucous membrane of small intestine: two typhoid ulcers in ileum; liver enlarged and fatty; heart hypertrophied, weight sixteen ounces, slight thickening of mitral valve. Other organs healthy.—*Stanton Hospital, Washington, D. C.*

CASE 54.—Private Peter A. Beanson, Co. A, 52d N. Y.; age 38; was admitted Nov. 23, 1863, having been sick five weeks with typhoid fever (malarial). There was no tenderness in the right iliac region: the tongue was coated with a black fur and the skin tinged yellow; he had a purulent discharge from the ear. Persistent diarrhœa set in on December 14, with occasional delirium and great prostration. Erysipelas attacked the face on the 17th and the patient became comatose and had convulsive twitchings of the limbs. He died next day. *Post-mortem* examination on the 19th: Body not much emaciated. The pharynx, larynx and trachea were inflamed and ulcerated: the mucous membrane was of a purplish color except about the chordæ vocales, where it was stone-gray; the epiglottis was ulcerated on both sides, the fold of mucous membrane running from it to the cornu major on the left side especially ulcerated: the mucous membrane over the arytenoid cartilages was much tumefied: there was a small abscess between the cricoid cartilage and the pharynx. The lungs were congested posteriorly but otherwise healthy. The liver was healthy. Peyer's patches were ulcerated but not elevated, the ulcers blackish and with thick, sharply defined edges: the bases of some were so discolored that the dark hue was conspicuous through the peritoneum; the solitary glands were not seen.—*Asst Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

CASE 55.—Private James Underwood, Co. D, 186th N. Y.: age 19: was admitted Nov. 30, 1864, with remittent fever which became continued on December 3, presenting delirium and typhoid symptoms: afterwards bronchitis occurred, with an uncontrollable and exhausting diarrhœa and great abdominal tenderness. He died on the 15th. *Post-mortem* examination: Lungs œdematous, with indications of pneumonia as well as bronchitis: Peyer's patches extensively ulcerated.—*Surg. E. Bentley, U. S. V., Third Division Hospital, Alexandria, Va.*

CASE 56.—Private Chauncey O. Parcher, Co. E, 13th Vt., was admitted Dec. 14, 1862, with typho-malarial fever. This patient had so far convalesced as to sit up a part of the time, when a relapse occurred, from which he never recovered. After this he began to complain of great pain in the right ear, in which an abscess formed and was discharged with relief to the pain. But the ear became a second time the seat of severe pain, which extended to the whole head and was particularly severe in the occiput. Delirium followed and he died Feb. 5, 1863, about forty-eight hours after its accession, coma having in the meantime supervened. *Post-mortem* examination one hundred hours after death: The body was not much emaciated. Nothing abnormal was detected in the brain. The stomach and

abdominal viscera appeared healthy with the exception of the ileum, in which, especially towards the ileo-cæcal valve, a number of Peyer's patches were enlarged, inflamed and ulcerated, the ulcers, however, seemed well advanced in the process of cicatrization.—*Third Division Hospital, Alexandria, Va.*

Case 57.—Private William Uncapher, Co. H, 140th Pa., was admitted July 22, 1863, with typho-malarial fever. He sank gradually, dying comatose on August 10. *Post-mortem* examination eleven hours after death: There were pleuritic adhesions on the left side and hypostatic congestion in the posterior parts of both lungs, but otherwise the lungs appeared healthy. The heart was flabby. The liver was much enlarged; the spleen weighed a pound and three-quarters; the kidneys were normal; the bladder contracted and nearly empty. Peyer's patches were thickened and ulcerated; the solitary glands of the ileum were enlarged to the size of small shot. The mesenteric glands were greatly swollen; some presented yellow spots of softening and others contained a creamy dark-yellow fluid. —*Jarvis Hospital, Baltimore, Md.*

Case 58.—Private Jesse Cassel, Co. C, 179th Pa.; age 24; was admitted July 2, 1863, with typho-malarial fever, which, after a few days, became typhoid and accompanied with diarrhœa. Opiates and astringents failed to restrain the diarrhœa, which became colliquative. He died delirious, picking at the bedclothes, on the 26th. *Post-mortem* examination "revealed nothing but slight ulceration of Peyer's glands."—*Ass't Surg. C. C. Lee, U. S. A., Douglas Hospital, Washington, D. C.*

Case 59.—Private Thomas Hurten, Company C, 140th Ind.; age 18; was admitted Jan. 29, 1865, with typho-malarial fever. He died February 8. *Post-mortem* examination eleven hours after death: Lungs hypostatically congested; posterior pleuritic adhesions on left side; heart flabby. Liver weighed seventy-six ounces; spleen twenty-eight ounces; mesenteric glands greatly swollen, varying from the size of a pea to that of an almond, some containing a creamy dark-yellow fluid, and one presenting some yellow points of softening; Peyer's patches enlarged and ulcerated in the lower part of the ileum,—in the upper part was a patch four inches long; solitary glands much enlarged, feeling like small shot beneath the mucous membrane; kidneys normal.—*Douglas Hospital, Washington, D. C.*

Case 60.—Private Oscar F. Hunt, Co. H, 9th Mich.; age 20; was admitted Dec. 6, 1864, with typho-malarial fever, and died on the 9th. *Post-mortem* examination twenty hours after death: Thoracic viscera normal; large intestine greatly distended with air; appendix vermiformis inflamed; ileum contracted in its calibre, and Peyer's patches elevated and in various stages of softening and ulceration.—*Hospital No. 8, Nashville, Tenn.*

Case 61.—Private James Stone, alias Paul Shay, Co. F, 61st N. Y.; admitted March 3, 1864. Died 14th, of typho-malarial fever. *Post-mortem* examination five hours after death: The body was much emaciated. The lungs and heart were healthy, but the pericardium contained a large quantity of serum. The liver weighed sixty-one ounces; the gall-bladder was empty. The spleen, stomach, duodenum, jejunum and large intestine were healthy; the ileum was much congested and inflamed throughout, and many of Peyer's patches presented large ulcers.—*Act. Ass't Surg. Lloyd Dorsey, Harewood Hospital, Washington, D. C.*

Case 62.—Private Eber Elmer, Co. E, 186th N. Y.; age 17; admitted Oct. 21, 1864. Diagnosis—typho-malarial fever. Died 24th. *Post-mortem* examination thirty hours after death: Body muscular and well developed; sudamina on chest and abdomen; sordes on teeth; slight suggillation posteriorly. Lungs congested; lower lobe of left and upper and lower lobes of right lung hepatized posteriorly; base of left lung covered with recent lymph; each pleural cavity containing two ounces of bloody serum; bronchi congested and filled with frothy mucus; bronchial glands normal. Heart healthy, small clots in the left and a large clot in the right cavities. Stomach filled with air and dark grumous blood; small intestine congested and inflamed; Peyer's patches much thickened, especially near ileo-cæcal valve, where there was one small ulcer; mesenteric glands dark and enlarged; colon and rectum healthy. Liver large, healthy; gall-bladder containing six drachms of dark bile; spleen enlarged, softened, quite dark in color; pancreas, kidneys and bladder healthy.—*Second Division Hospital, Alexandria, Va.*

Case 63.—Private Edward Martin, Co. H, 12th Vt., admitted Dec. 12, 1862. Diagnosis—typhoid remittent fever. Died 17th. *Post-mortem* examination: The abdomen was moderately tympanitic; recti muscles very much injected and in their sternal third ecchymosed. The anterior portion of the abdominal surface of the diaphragm was coated with plastic lymph; the omentum was greatly injected and adherent by recent lymph to the abdominal parietes; the mesentery was injected; the mesenteric glands greatly enlarged. The mucous membrane of the ileum was congested, especially near the ileo-cæcal valve; Peyer's patches were ulcerated and the peritoneum corresponding to each patch was dark-colored.—*Third Division Hospital, Alexandria, Va.*

Case 64.—Private Wallace T. Fowler, Co. C, 42d Mass.; age 19; was admitted Oct. 29, 1864, having been taken sick a week before with a decided chill followed by hot skin, thirst, severe headache and backache and a diarrhœa of two or three passages daily. On admission there was no delirium, epistaxis, deafness nor tympanites; pulse 120; tongue furred and dry; some bronchial irritation. Diagnosis—typho-malarial fever. He improved under small doses of blue-pill and ipecacuanha, acetate of potash, squill and spirit of nitre until November 12, when his respiration became hurried and his pulse accelerated. On the 15th he expectorated rusty sputa, although none of the physical signs of pneumonia were present. Until the day of his death, the 17th, he did not appear to be very ill. Pain in the epigastrium, feeble pulse, great prostration and vomiting, at first of green liquid and afterwards of matters resembling coffee-grounds, preceded death for some hours; his mind was clear to the last. *Post-mortem* examination sixteen hours after death: Not much emaciation; suggillation posteriorly. Omentum inflamed; intestines reddened and interadherent; peritoneal cavity containing two pints of a turbid yellow liquid emitting an unpleasant fæcal odor. There was a perforation one-eighth of an inch in diameter about the middle of the ileum, the result of ulceration in one of Peyer's patches [*Specimen* No. 439, Med. Sect., Army Medical Museum], and there were several thick-

ened and ulcerated patches near the perforation and in the lower part of the ileum. Spleen enlarged and softened; liver dark. Other organs not examined.—*Surg. E. Bentley, U. S. V., Second Division Hospital, Alexandria, Va.*

(B.) Peyer's patches ulcerated and the large intestine also implicated—4 cases.

Case 65.—Private John D. Evans, Co. H, 1st Mich. Cav.; age 28; admitted July 20, 1864, from Camp Distribution, Va. Diagnosis—typho-malarial fever. He had frontal headache, pain in limbs and back, anorexia, sickness at stomach, troublesome diarrhœa, hectic flush on cheeks, irritative cough, deafness of right ear, tongue yellow-coated and eyes suffused and yellowish. Sinapisms were applied over the right lung and liver, and tincture of aconite in acetate of ammonia was given every two hours, with subsequently Hope's mixture and wine bitters. He seemed to improve for some days, but on August 1 he refused food altogether; his cough increased, becoming dry, irritable and paroxysmal, lasting for ten minutes at a time and preventing sleep; his urination became difficult, but this was relieved by extract of buchu and sweet spirit of nitre; and the right parotid became enlarged, indurated and painful. Next day there was a very offensive fetid discharge from the nose and muttering delirium set in, followed by death. *Post-mortem* examination two hours after death: Robust, muscular. Right lung and pleura somewhat inflamed, large abscess in the middle lobe; liver much congested; œsophagus, stomach and intestines inflamed throughout; Peyer's patches, cæcum and colon ulcerated.—*Third Division Hospital, Alexandria, Va.*

Case 66.—Private Adam Cull, Co. D, 28th Mich.; age 25; admitted Feb. 13, 1865. Diagnosis—typho-malarial fever and congestion of lungs. Died 19th. *Post-mortem* examination fourteen hours after death: Well developed; large deposit of fat; recent blister-marks on neck and chest; slight suggillation posteriorly; great rigidity. Pleuritic adhesions on both sides; right lung congested, crepitant in upper lobe. Stomach distended with air; Peyer's patches inflamed, in many places ulcerated; large intestine congested. Liver nutmeg; spleen enlarged; kidneys small; other viscera normal.—*Third Division Hospital, Alexandria, Va.*

Case 67.—Private Asa C. Wentworth, Co. H, 19th Me.; was admitted Nov. 26, 1863, with jaundice. [This man appears on the register of the regimental hospital as admitted on the 18th with typho-malarial fever and sent to general hospital on the 22d.] Died Jan. 12, 1864. *Post-mortem* examination twenty-two hours after death: The pharynx and larynx were inflamed; the soft palate hard, stiff and white; the tonsils unaffected; between the pharynx and right arytenoid cartilage was a large abscess with hard, yellowish-white walls; the cartilage mentioned was the seat of a protuberance, probably a collection of pus; there was also a small abscess immediately above the left greater cornu of the hyoid bone; the vocal chords and the upper surface of the epiglottis were œdematous. The pericardium contained seventeen drachms of yellowish fluid; the heart was very soft. The liver was bronzed and mottled with hard lardaceous spots, the gall-bladder full of dark-brown viscid bile; the spleen was rather small and extremely soft; the pancreas soft and of a dull-red color; the kidneys congested. In the ileum the villi were very soft; Peyer's patches were not raised, but one of them presented an ulcer with low rounded edges, at the base of which the transverse muscular fibres could be seen; the ileum had the ironed-out appearance. The colon was slate-colored, its solitary follicles whitish, with conspicuous dark-spotted centres.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 68.—Private Charles Bangson, Co. I, 14th Conn.; age 27; was admitted Oct. 19, 1863, with typho-malarial fever. He had been sick for twelve days and on admission was in a semi-comatose condition; tongue dry, glazed and red at the tip and edges; pulse 120, full, bounding and incompressible. On the 27th the pulse was 108 and scarcely perceptible at the wrist; the patient had some cough with thick, tenacious yellowish sputa. The ileo-cæcal region was tender, but no eruption was observed. Death occurred on the 29th. At first tincture of aconite was given, for which, on the 25th, quinine, carbonate of ammonia and whiskey were substituted. *Post-mortem* examination four hours after death: The trachea was palish but mottled at its bifurcation; several ecchymotic spots were observed on its posterior surface. The œsophagus was pale and its mucous membrane firm. The right lung was perfectly healthy; the left lung weighed thirty-one ounces and a half, its upper lobe being congested generally and solidified in its central parts and its lower lobe mottled with dark-brown spots about the size of a pea. The heart contained fibrinous clots in its right chambers. The liver was congested and weighed seventy-two ounces; the spleen firm, fourteen ounces and a half; the pancreas normal; the kidneys congested. The small intestine near the ileo-cæcal valve was of a darker color than elsewhere; its mucous membrane was healthy to within ten feet of the valve, at which point it became unusually vascular and softened, Peyer's patches and the solitary glands being of a deep pink color; lower down Peyer's glands became enlarged, whitish and hard, with abrupt edges; still lower down they were ulcerated, which condition frequently existed in the centre of a patch while its margins remained enlarged and hard; the glands near the valve were ulcerated in their whole superfices, some of them looking not unlike Hunterian chancres; the ulceration did not extend deeper than the mucous membrane; the solitary glands were enlarged and of a dark-purple color in the lower part of the ileum, and some near its termination were ulcerated. The mucous membrane of the cæcum and ascending colon was of a dark-bluish color; lower down it was pale and in some places pink; the solitary glands were conspicuous but not elevated, appearing as whitish spots with pigmented centres.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

(C.) Condition of Peyer's patches not stated; the intestines variously affected—15 cases.

Case 69.—Henry Reynolds, Co. C, 79th N. Y., was admitted Aug. 21, 1863, having been sick ten days with headache and weakness of limbs, followed by fever. Diagnosis—typho-malarial fever. He was weak and somewhat emaciated; his pulse feeble and compressible; tongue slightly coated; appetite poor; bowels regular. He died on the 26th. *Post-mortem* examination thirty-one hours after death: Lungs much congested; a large amount of serum in right pleural cavity; heart normal, containing a large clot; liver somewhat congested; gall-bladder much distended; spleen enlarged, congested and softened; mesenteric glands enlarged.—*West End Hospital, Cincinnati, O.*

CASE 70.—Private Joseph E. Hudson, Co. A, Gordon's Ark. regiment; age 19; admitted Dec. 16, 1864; typho-malarial fever. On admission he had fever and diarrhœa; his tongue was slightly coated, pulse 100, appetite fair, respiration normal, legs swollen from the knees down. He rested well and in a few days the swelling of the legs became somewhat reduced, but the diarrhœa persisted. He did not suffer, but grew weaker and died on the 22d. *Post-mortem* examination: There was emaciation with œdema of the legs and feet; the blood was very poor and thin. The lungs and heart were normal; the spleen about three times the normal size; the gall-bladder distended with bile; the mesenteric glands so enlarged that the mesentery had the appearance of being one continuous gland; the solitary glands disorganized and the mucous coat of the rectum inflamed and softened.—*Act. Ass't Surg. H. C. Newkirk, Rock Island Hospital, Ill.*

CASE 71.—Private Warren M. Burton, Co. K, 28th Ala.; age 33; was admitted Dec. 7, 1864, with typho-malarial fever. He had been sick for four weeks with diarrhœa and general malaise. On admission his bowels were slightly relaxed, tongue heavily coated with a brown cracked fur, skin hot, pulse frequent and feeble, countenance shrunken; he was inclined to sleep, which he did heavily and with the whites of his eyes exposed. Hiccough speedily came on and he died on the 8th. *Post-mortem* examination ten hours after death: The lower portion of the right pleura was inflamed. The heart contained white clots. The peritoneum was much injected and tinged throughout of a yellow color. The spleen was soft and friable. The stomach contained about a pint of dark liquid with detached shreds of its mucous membrane floating in it; the lining membranes of the œsophagus and duodenum were also softened and disintegrated. The mucous coat of the bowels was much congested throughout; fæcal matter in the rectum was of normal consistence but white and fetid.—*Act. Ass't Surg. J. B. Young, Rock Island Hospital, Ill.*

CASE 72.—Private James Bozeman, Co. I, 40th Ala.; age 34; admitted Dec. 22, 1864; typho-malarial fever. This man enlisted in April, 1862; he had measles soon after and since then has had diarrhœa almost constantly and frequent attacks of fever. He was captured in June, 1864. His present attack commenced December 18, with pain in the head and breast and chilly sensations followed by fever. When admitted his tongue was coated brown with red margins; bowels loose; pulse 120; cough and slight expectoration; anorexia and thirst. He died on the 23d. *Post-mortem* examination twelve hours after death: Great emaciation. The lower lobe of the left lung was congested. The liver was pale. The intestinal mucous membrane was congested, and in the rectum softened.—*Act. Ass't Surg. H. C. Newkirk, Rock Island Hospital, Ill.*

CASE 73.—Bellfield W. Ferguson, a citizen of Mo.; age 63; typho-malarial fever. Died Dec. 20, 1864. *Post-mortem* examination: The body was greatly emaciated. The posterior part of the left lung was congested and its pleura inflamed. The intestines showed some congestion with disorganization of the solitary glands; the mesenteric glands were enlarged.—*Act. Ass't Surg. J. M. Witherwax, Rock Island Hospital, Ill.*

CASE 74.—James Case, citizen of Mo. Typho-malarial fever. Admitted Dec. 1, 1864; died 26th. On the day of his death he had a dry furred tongue which he was unable to protrude; he spoke with difficulty; respiration was quick and labored; the surface dry and cold and the pulse imperceptible. He had a slight erysipelatous swelling of the left ear. *Post-mortem* examination: The lungs were dark and congested posteriorly; the liver was enlarged. "There were commencing ulcerations of the intestines, with general indications of internal congestion."—*Act. Ass't Surg. J. M. Witherwax, Rock Island Hospital, Ill.*

CASE 75.—Stockton M. Bayne, Co. H, 3d Ga. Cav.; admitted Dec. 3, 1864; typho-malarial fever. Died 24th. *Post-mortem* examination: Right lung normal; lower lobe of left lung hepatized gray; four ounces of dark yellow serum in pericardium; heart flaccid, both sides containing thrombi extending into the vessels. Liver normal; gall-bladder distended; spleen enlarged, congested and softened; mesenteric glands greatly enlarged. Mucous membrane of small intestine ulcerated in various parts, and that of colon and rectum highly congested and disintegrated.—*Act. Ass't Surg. J. M. Witherwax, Rock Island Hospital, Ill.*

CASE 76.—William C. Norton, Co. A, Wood's Missouri battery. Typho-malarial fever. Died Jan. 20, 1865. *Post-mortem* examination: The heart, lungs and liver were normal. The spleen was slightly enlarged; the small intestine congested; the mesenteric glands enlarged; the rectum ulcerated in patches through the mucous and muscular coats, some portions appearing gangrenous.—*Act. Ass't Surg. J. M. Witherwax, Rock Island Hospital, Ill.*

CASE 77.—Jesse Eaton, citizen; admitted Dec. 21, 1864; typho-malarial fever. Died 31st. He suffered from sore throat, chills, a slight swelling of the right cheek of an erysipelatous character, and had "many symptoms of a typhoid condition." *Post-mortem* examination six hours after death: Lungs healthy; heart contained white clots in right side; liver and spleen somewhat congested; lower portion of ileum presenting numerous small ulcers; descending colon stricturned for six inches of its length, so that an ordinary lead-pencil could scarcely be passed.—*Act. Ass't Surg. W. Matthews, Rock Island Hospital, Ill.*

CASE 78.—Private Francis Scott, Co. K, 41st N. Y.; age 35; admitted Feb. 13, 1865; typho-malarial fever and chronic diarrhœa. He was treated with quinia, alcoholic stimulants and turpentine. In the progress of the case the lower extremities became œdematous and signs of valvular disease were discovered. He died March 21. *Post-mortem* examination: Body much emaciated; lower extremities œdematous. The heart was slightly hypertrophied, its aortic valves thickened. The liver was enlarged and deeply bronzed. The mucous membrane of the intestines was softened throughout.—*Third Division Hospital, Alexandria, Va.*

CASE 79.—Private Abraham J. Cooper, Co. A, 186th N. Y.; age 20; admitted Nov. 30, 1864; typhoid fever. [The diagnosis at the Ninth Army Corps Field Hospital, on the 24th, was typho-malarial fever, and at the Depot Field Hospital, City Point, Va., on the 26th, remittent fever.] Symptoms on admission: Pulse varying from 90 to 110, feeble and thready; skin hot and dry; tongue dry, extremely red and gashed; teeth, gums and lips incrusted with

sordes; deafness; stupor; low delirium. When undisturbed he lay with his eyes half closed muttering broken and unconnected sentences; when aroused he had a vacant expression and was unable to answer correctly. During the first twenty-four hours after admission he had four passages from the bowels; the abdomen was tympanitic, very tender over the small intestine and cæcum, and marked with a few petechiæ and sudamina. Turpentine emulsion, laudanum and milk-punch were administered. Next day there was a slight improvement: The pulse became somewhat stronger, the tongue less tremulous and protruded with more ease; the patient was able to answer a few questions correctly, but the abdominal symptoms continued and there was some epistaxis. On December 2 the pulse became somewhat stronger and less frequent, the tongue quite moist, the sordes partially removed and the diarrhœa checked; but at 9 P. M. the diarrhœa returned, several involuntary stools were passed and the patient fell into a stupor from which he never aroused. He died at 3 A. M. of the 3d. *Post-mortem* examination eight hours after death: Lungs crepitant throughout; liver pale, with well marked nutmeg appearance; spleen of full size and softened; kidneys full of blood, the pyramids of a dark-red color; mesenteric glands enormously enlarged; colon pale and without ulceration; ileum injected.—*Act. Ass't Surg. W. C. Minor, Third Division Hospital, Alexandria, Va.*

CASE 80.—Private Albert Mathews, Co. A, 174th Ohio; age 19; was admitted Jan. 28, 1865, with typho-malarial fever. When admitted his bowels were loose, skin hot and dry, tongue dry and red, pulse 100 and feeble. On February 5 the diarrhœa became profuse. A chill followed by fever and sweating occurred on the 12th and again next day. Quinine was freely administered without apparent benefit. He died on the 27th. *Post-mortem* examination three hours after death: Body much emaciated. Membranes of brain much injected; cerebral hemispheres coated with coagulable lymph; substance of brain much injected and softened; lateral ventricles containing serum and a deposit of lymph. Heart healthy; liver and spleen adherent to diaphragm; gall-bladder distended with dark bile; omentum congested; intestinal mucous membrane extensively diseased and portions of ileum gangrenous.—*Act. Ass't Surg. Sample Ford, Cumberland Hospital, Md.*

CASE 81.—Private William Henry Clay, Co. D, 28th U. S. Colored troops; age 21; was admitted July 21, 1864, on account of inguinal hernia on the right side and enlarged inguinal glands. On April 6, 1865, the records present him as feverish and jaundiced, without giving information as to the period of onset. His pulse was 95, tongue coated with a yellowish fur, skin dry; he had thirst, anorexia, nausea, tenderness in the right iliac region and constipated bowels; there was some mental torpor and considerable muscular debility. On the 8th his pulse was small and frequent; he had a cough and complained of pain in the right side of the chest. He died next day. A mercurial purge operated well on the 6th; subsequently the bowels were so loose that opium was employed. Quinine and stimulants were freely administered. The case is recorded by the attending physician as one of typho-malarial fever. *Post-mortem* examination: The thoracic viscera were normal. The liver was very light-colored and soft; the spleen and kidneys softened and congested. The whole of the intestinal canal was inflamed; the mesenteric glands enlarged. The peritoneum was inflamed and the sac contained about half a pint of sero-purulent liquid.—*Act. Ass't Surg. Frank Buckland, L'Ouvreture Hospital, Alexandria, Va.*

CASE 82.—Private N. Henry Downing, Co. A, 8th Ill. Cav., was admitted June 18, 1864, with typho-malarial fever. He had not been in his usual vigorous health for several weeks, but had continued on duty until admission, when he was suffering from pyrexia, severe headache referred to the temples, diarrhœa and dull pain in the lower extremities; his eyes were suffused and painful and his tongue heavily coated with a dark-yellow fur, the edges being of a livid hue. Quinine, twenty-five grains in the twenty-four hours, and chlorate of potassa were administered. Next day he appeared improved,—pulse 80, headache decreased, tongue less dark; but a little pain and tenderness had developed in the ileo-cæcal and hypogastric regions and there was slight epistaxis. The quinine was continued with a saline, diuretic and diaphoretic mixture. He remained in this condition until the 24th, when his countenance became bright and pleasant and he was free from pain; pulse 120 and full; coating of the tongue lighter and the edges pale; he vomited a little greenish liquid in the morning and had an exacerbation of fever in the afternoon. Twenty-eight grains of quinine with chlorate of potassa were ordered to be taken in the twenty-four hours. Next day his skin was moist and cool, pulse 96, but there remained a little pain in the bowels, which afterwards became a feeling of fulness and was relieved by castor oil and fomentations. On the evening of the 27th he was suddenly seized with a sharp pain in the bladder and penis and inability to void his urine; the catheter showed his bladder to be empty. By next morning the pain had extended over the whole abdomen, which was very tender; his countenance was anxious; pulse 120 and small; tongue moist but with the light-colored fur and pale edges; he lay on the right side with his thighs flexed. On July 1 he became some easier under the continued use of morphine, but later in the day the pain again became intense and he died at 2 A. M. of the 2d. *Post-mortem* examination ten hours after death: The liver, spleen and kidneys were healthy. The ileum was perforated about four inches from the ileo-cæcal valve and there was extensive peritoneal inflammation. [*Specimen* 324, Med. Sect., Army Medical Museum, is from this case.]—*Surg. A. Hard, 8th Ill. Cav., Regimental Hospital.*

CASE 83.—Private Daniel Hare, Co. D, 175th Ohio; age 18; was admitted Oct. 15, 1864, with quotidian intermittent fever, which passed into typhoid fever. He was weak and much emaciated from chronic diarrhœa, but his bowels were now regular. He had a chill and fever daily, for which quinine was freely given with beneficial effect; but on the 19th diarrhœa set in and fever was developed in the evening. The bowels remained moderately checked by astringents until the 24th, when, as they became looser, the tongue blackened. Turpentine was given. Three days later retention of urine required relief by catheter and tenderness over the pubes called for fomentations. The suprapubic tenderness continued until the 30th, when a violent chill occurred, lasting for an hour, and followed by high fever, profuse perspiration, great abdominal tenderness, coldness of the extremities and death. *Post-mortem*

examination twenty-one hours after death: Heart normal; lungs congested posteriorly. Abdominal viscera generally interadherent; peritoneum congested and containing liquid fæces; ileum ulcerated in patches for three and a half feet above the ileo-cæcal valve, some of the ulcers having reached the peritoneum, and two, about two feet from the valve, having perforated this membrane. Other organs not examined.—*Hospital No. 8, Nashville, Tenn.*

(D.) Condition of Peyer's patches variously stated, but not ulcerated; intestines more or less affected, but no ulceration of the ileum—9 cases.

Case 84.—Serg't John H. Peters, Co. E, 120th Pa.; admitted April 20, 1863. Diagnosis—typho-malarial fever. Died 30th. *Post-mortem* examination nine hours after death: Some rigor mortis. Brain weighed forty-six ounces and a half. Mucous membrane of trachea pale. Right lung fifteen ounces and a half, healthy; left lung thirteen ounces and three-quarters, dark blue, its apex purple. Heart normal; soft black clot in right ventricle; small narrow clot in left ventricle. Liver forty nine ounces and a half, dark purple externally, paler on section, rather soft; capsule of Glisson readily torn. Spleen eight ounces and a quarter, soft, dark mulberry color, trabeculæ conspicuous. Pancreas four ounces and one-quarter, natural. Stomach mottled dark and pale red. Mucous membrane of small intestine generally pale, with irregular patches of congestion; Peyer's patches pale; solitary follicles, especially in lower part, dark purple in color, enlarged and ulcerated; mucous membrane of vermiform appendix dark-colored and presenting two ulcerated patches one-eighth of an inch in length. Large intestine gray throughout; solitary glands conspicuous; three ulcers in the lower part of the bowel—the first, one inch in diameter, in the sigmoid flexure, the others, smaller, in the middle portion of the rectum. Kidneys congested.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 85.—Private A. C. Starker, Co. D, 15th N. J., was admitted Nov. 23, 1863, as a case of typho-malarial fever: Pulse 115 to 130, irritable; tongue dry as a pine shaving, glossy and red on its edges; sordes on teeth and gums; urine scanty, densely loaded and very fetid; stools involuntary; friction-sound on right side of chest. In answer to questions he talked incoherently for a few seconds and then relapsed into stupor; he picked at the bedclothes, and drawing his legs up would suddenly straighten them in an apparent effort to kick off the covering. Subnitrate of bismuth controlled the diarrhœa; stimulants were freely administered. He died on the 28th. *Post-mortem* examination ten hours after death: Right lung adherent to costal pleura by a strong and dense false membrane; left lung distended with a black fluid, unadherent; heart normal. Liver very pale, much enlarged and softened; spleen larger than usual and softened; kidneys one-fourth larger than normal and indurated, especially in their lower fourth, where their substance could not be crushed between the thumb and finger. Peyer's patches distinct and elevated, their edges ragged and raised one-tenth inch above the surrounding surface; solitary glands of large intestine ulcerated; lymphatic glands enlarged—one, as large as a walnut, was on section much like the spleen.—*Act. Ass't Surg. W. H. Letterman, Douglas Hospital, Washington, D. C.*

Case 86.—Private Patrick Conlin, Co. E, 25th Mass.; age 36; was admitted March 11, 1865, with symptoms of typho-malarial fever. He had decided fever with frequent, compressible pulse, hurried breathing, hot dry skin, furred dry tongue, severe headache and costive bowels; his countenance was dusky, his eyes injected, and there was great prostration with considerable mental confusion and hebetude. Numerous red spots, a line in diameter or less, were observed chiefly on the chest and abdomen; they were somewhat elevated and did not disappear completely on pressure. On the 13th the tongue was more thickly coated and brown, the teeth and gums covered with sordes, the urine scanty and high-colored, the abdomen tender and painful; no abnormal condition of the lungs was detected by auscultation or percussion. On the 15th the headache was succeeded by delirium and occasional stupor, with contracted pupils, drooping of the lids and subsultus tendinum; the bowels were constipated. Later the spots on the skin became of a dusky crimson and quite unaffected by pressure. He died comatose on the 17th. *Post-mortem* examination nineteen hours after death: A large quantity of serum was found in the subarachnoid space and a smaller quantity in the ventricles; the membranes and substance of the brain were congested. The heart contained some imperfectly formed clots and fluid blood. The lungs were congested; the lower portion of the right lung was in a condition of gray hepatization; the left lung weighed twenty-one ounces, the right thirty-two ounces. The liver was soft, well filled with blood and weighed sixty-eight ounces; the gall-bladder contained very black bile; the spleen was flaccid and slightly enlarged; the pancreas was reddened and weighed seven ounces. The intestines generally were dark and congested; the glands of Peyer conspicuous and dark-colored. The kidneys were apparently normal.—*Ass't Surg. George M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Case 87.—Private Niles Ivers, Co. F, 6th Wis., was admitted April 21, 1864, with typho-malarial fever. He stated that he had been sick for a week with fever, which began with chills. He was much prostrated; his bowels were loose and his tongue dry and brown with red edges. Quinine, stimulants and nutriment were ordered. In a few days his respiration became accelerated and he complained of cough and pain in the side, for which he was blistered. Under this treatment he gradually improved, the fever subsiding, but a considerable quantity of liquid remained in the pleural cavity, for the removal of which iodide of potassium was given in free doses and an occasional blister was applied, but without much benefit; the effusion did not embarrass his breathing. Convalescence was slow and he was unable to leave his bed, when, about June 1, symptoms of hectic appeared. He failed gradually and died on the 23d. *Post-mortem* examination twenty-four hours after death: Body much emaciated; rigor mortis moderate. The left pleural cavity contained about a pint and a half of purulent liquid which compressed the lung against the spinal column; the right cavity contained about six ounces of serum; the right lung was healthy. The intestines were distended with gas; the mucous coat of the stomach and of the intestinal canal was thickened and softened; the glands of Brünner and the solitary glands of the ileum were enlarged and prominent but not ulcerated; the patches of Peyer presented the shaven-beard appearance. The liver was about one-third

larger than normal and contained a number of minute abscesses; the spleen was enlarged to three times its normal size and also contained abscesses; the kidneys were healthy. [*Specimens* 325–6, Med. Sect., Army Medical Museum, are from the spleen of this case.]—*Ass't Surg. Geo. A. Mursick, U. S. V., Stanton Hospital, Washington, D. C.*

Case 88.—Private George Pitcher, Co. H, 23d Mich.; age 36; was admitted Feb. 11, 1865, with chronic rheumatism. While under treatment he became attacked, March 18, with symptoms of typho-malarial fever. He progressed favorably until the 23d, when abdominal pains set in; next day he became semi-comatose and died. He was treated with turpentine emulsion and carbonate of ammonia. *Post-mortem* examination twelve hours after death: Liver much enlarged, bronzed; intestines congested, small intestine showing shaven-beard appearance of Peyer's patches and four intussusceptions from four to six inches long.—*Third Division Hospital, Alexandria, Va.*

Case 89.—Private Lewis Sage, Co. A, 186th N. Y., was admitted Nov. 30, 1864, from City Point, Va., where he had been under treatment for typho-malarial fever. On admission he was in an unconscious condition, with low delirium, troublesome diarrhœa and a harassing cough; pulse 100, soft. He was treated with milk-punch and ammonia, expectorants and turpentine emulsion with laudanum; but he sank gradually and died December 10. *Post-mortem* examination: All the viscera appeared to be healthy except the intestines. The mucous membrane of the ileum was deeply injected throughout and of a dark purple color; its solitary follicles were enlarged and some near the ileo-cæcal valve were ulcerated; Peyer's patches, which were slightly thickened, presented the shaven-beard appearance. The colon presented a number of deep ulcers, especially at its extremities; in the transverse colon several of the ulcers were cicatrizing. An intestinal diverticulum, two inches and a half long, was found in the ileum about three feet and a half from the ileo-cæcal valve. [Nos. 465 and 466, Med. Sect., Army Medical Museum, are from this case.]—*Act. Ass't Surg. W. C. Minor, Third Division Hospital, Alexandria, Va.*

Case 90.—Private J. T. Pierce, Co. G, 33d Mass., was admitted June 16, 1863, with typho-malarial fever. He had frequently suffered from intermittent fever. When admitted he had been sick for some time and was greatly emaciated; he had some diarrhœa; his tongue was coated in the middle, dry and cracked; pulse 132. After this his breathing became hurried, and coarse mucous râles were heard over both lungs; there was also marked nervous prostration. He died on the 21st. *Post-mortem* examination twenty-six hours after death: Body emaciated; rigor mortis slight. The brain was normal. The mucous membrane of the œsophagus was of a pale purple color. The trachea contained much bronchial secretion; its mucous membrane was purplish. The upper and middle lobes of the right lung were solidified except their anterior free borders, which were pale and healthy; the lower lobe was congested hypostatically but not solidified. The posterior portion of the left lung was in a state of gray hepatization, the anterior part healthy. The right lung weighed twenty-seven ounces and a quarter, the left thirty-seven ounces; the bronchial glands were large, one of them softened. The pericardium was lined by recent lymph roughened by papillary elevations; it contained six drachms of flaky serum. The right cavities of the heart contained a large venous clot, the left cavities a mixed clot which extended into the aorta. The liver weighed fifty-seven ounces, it was pale and slightly softened; the gall-bladder contained a drachm of greenish-brown viscid bile. The spleen was firm and weighed three ounces and three-quarters. The pancreas was firm and white, it weighed two ounces and a half. The right kidney weighed five ounces and a quarter, the left five and a half, both were pale and flabby. No prominent lesion was observed in the intestines; the lower part of the jejunum was contracted and its mucous membrane pale; Peyer's patches were rather pale and dotted with points of black pigment; the large intestine was contracted and its mucous membrane of a pale bluish color.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 91.—Private Willard Rock, Co. E, 16th N. Y.; age 19; was admitted Aug. 10, 1862. He was convalescing from Chickahominy fever and diarrhœa; but afterwards, from imprudence, was again attacked with diarrhœa and died October 5. *Post-mortem* examination next day: Slight emaciation. The heart and lungs were normal. There were old adhesions of the right half of the right lobe of the liver to the diaphragm, but the organ was sound; the spleen was very small but otherwise natural; the kidneys pale. There was moderate inflammation along the great curvature of the stomach. In the ileum were three large patches, about fourteen inches long, of intense inflammation, with the intervals between them moderately inflamed; these patches presented many small ecchymoses. The colon was much contracted, intensely inflamed at its commencement and moderately inflamed throughout, with here and there small ecchymoses. The agminated and solitary glands of the small and large intestines contained black pigment.—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 92.—Lewis G. Baker; age 37; a citizen of Mo., was admitted Dec. 15, 1864, with typho-malarial fever. He stated that he had taken cold in November while making his escape from the rebel service. On admission his tongue was slightly coated, bowels loose, pulse 100, respiration normal, cough and expectoration slight, appetite small and thirst notable. Diarrhœa and increasing prostration were the prominent symptoms during the progress of the case. He died on the 23d. *Post-mortem* examination twelve hours after death: Emaciation. Gray hepatization of right lung; distention of gall-bladder; congestion of bowels and disorganization of the glands.—*Act. Ass't Surg. H. C. Newkirk, Rock Island Hospital, Ill.*

Cases entered as Typhoid, but the clinical histories suggestive of malarial complications—24 cases.

(A.) Peyer's patches ulcerated and the ileum or small intestine only affected—5 cases.

Case 93.—Private Daniel Plummer, Co. H, 33d Pa.; age 23; was admitted Oct. 2, 1861, with headache, diarrhœa, loss of appetite and strength. He had been sick five days, having had a chill and fever on each day. A bath was given, with quinine at night. Next day his face was flushed, eyes injected, skin hot, dry and rough, tongue coated whitish-gray, pulse 104, full; he had pain in the head and back, slight deafness, tinnitus aurium, insomnia,

confusion of thought and muttering; his bowels were tender and had been moved four times. Treatment—Dover's powder and quinine. During the five following days his tongue became dry and brown, pulse less frequent, 84, countenance more anxious and prostration much increased; his bowels were moved about twice daily. On the 8th the treatment was changed to turpentine, Dover's powder and whiskey-punch. A gallon of strongly acid urine, sp. gr. 1009, was passed on the 9th, but later in the disease the urine became alkaline. A blister was applied to the abdomen on the 14th. On the 16th he craved apples, and next day had some appetite; the bowels were quiet, having been moved but once daily for several days back. On the 18th gangrenous spots appeared on the blistered surface, which was dressed with chlorinated soda solution. Three days later an erysipelatous redness extended downward to the thigh and the patient was in extremely low condition, lying on his back with his mouth and eyes open, unable to protrude his tongue, his lips and teeth covered with sordes and his body generally, except the face and neck, with vibices. The gangrenous blistered surface was treated with a solution of one drachm of nitrate of silver in one ounce of water, but without benefit. His throat became sore on the 23d, and he died on the morning of the 24th. *Post-mortem* examination: The lungs were congested; the heart, liver, spleen and pancreas healthy; the kidneys inflamed and suppurating. The peritoneum was inflamed; the mucous membrane of the stomach unusually corrugated; the mesentery and its glands inflamed—of the latter some were ulcerated; the glands of Peyer in the ileum showed cicatrizing ulcerations.—*Seminary Hospital, Georgetown, D. C.*

Case 94.—William L. Layne, Co. G, 2d Ky.; age 28; was admitted Sept. 8, 1864, having been sick one week with feverishness, increased at night, anorexia, great thirst, headache, pain in the back and limbs, somewhat frequent but small stools, scanty urine, occasional epistaxis and increasing debility. On admission the headache was intense; he was listless and disposed to stupor, his sleep dreamful and unrefreshing, eyes congested, complexion venous, breathing slow, pulse 96, tongue brown with red margins, stools frequent, watery and fetid; there was tympanites, iliac and umbilical tenderness and perspirations, with sudamina on the chest and abdomen. He died comatose on the 13th. *Post-mortem* examination: Colon much distended with air; small intestine congested; Peyer's glands greatly congested, enlarged and in two patches immediately above the ileo-cæcal junction ulcerated; liver dark-colored; gall-bladder distended.—*Act. Ass't Surg. M. K. Gleason, Rock Island Hospital, Ill.*

Case 95.—Private Thomas B. Newcomb, Co. M, 11th Vt. Art.; age 26; was admitted Sept 8, 1864, from hospital at Frederick, Md., where his case was recorded on September 6 as one of coup-de-soleil. He stated that he had been very sick with constant nausea, vomiting and general pain for several days. He was treated with hydrocyanic acid and morphine, and on the 11th blue-pill, podophyllin and compound extract of colocynth were given on account of constipation. On the 13th he had occasional spasms, apparently of a hysterical character, and his skin and eyes assumed a yellow hue. Three days later he became much jaundiced, his tongue dry, face flushed and pulse 90, while he had frequent attempts at alvine evacuations but passed little each time. The jaundice disappeared on the 20th and well-marked typhoid symptoms set in, but with no diarrhœa nor abdominal tympanites. His strength failed, his tongue becoming dry and cracked. He complained of much pain over the region of the stomach and transverse colon, and his abdomen, on the 29th, became tympanitic. On the supervention of the typhoid condition he was treated with turpentine, chlorate of potash and Dover's powder, with hot fomentations and sinapisms. He died October 4. *Post-mortem* examination: Lungs healthy; fibrinous clots in both sides of heart; intestines near stomach and liver yellow-colored; gall-bladder disorganized, perforated and with light green bile in and around it; two or three feet of mucous membrane of jejunum and whole of ileum congested; Peyer's glands ulcerated and in some places nearly perforated.—*Act. Ass't Surg. Geo. W. Fay, Hospital Patterson Park, Baltimore, Md.*

Case 96.—Private Charles Perkins, Co. I, 1st Mich. Eng'rs; age 53; was admitted into Hospital No. 6, Nashville, Tenn., in September, 1862. Efforts were made to restrain the debilitating diarrhœa with paregoric, Dover's powder, mercury with chalk, blue mass, ipecacuanha and opium, nitrate of silver and opium, etc.; during the exacerbations of the fever neutral mixture with sweet spirit of nitre was given; during the apyrexia quinia and iron; oil of turpentine was tried, but it disagreed and was discontinued. The patient improved gradually under this treatment conjoined with a bland and nourishing diet, and convalescence seemed to be well established. Tonics and the milder stimulants had been administered for several days, when, all at once, diarrhœa recurred with some tympanites, the tongue became glossy, the pulse 130 to 140, the skin yellowish, and sudamina appeared in great profusion on the neck, breast and groin; he had a hacking cough, low delirium and subsultus tendinum; his countenance became hippocratic and he died October 26. *Post-mortem* examination: Body considerably emaciated. The pericardium contained two ounces of serum. The right lung was collapsed and pale, its lower portion hypostatically congested: the left lung was emphysematous. The heart was large; the right ventricle contained a quantity of uncoagulated blood: the left was empty. The liver was large but normal in texture and color; the gall-bladder filled with thin watery bile: the spleen large and soft. There was much venous congestion of the peritoneal coat of the stomach: its mucous membrane presented a number of soft blackish patches, and at the pyloric end there was some ulceration, which extended an inch and a half into the duodenum. The mucous membrane of the jejunum and ileum presented nothing remarkable except within twenty inches of the ileo-cæcal valve, where Peyer's patches were ulcerated: most of the ulcers were only three or four lines in diameter, but the dark tumefied patches were of considerable size. The mucous membrane of the ileo-cæcal valve was tumefied and the vermiform process filled with pus: the mucous membrane of the colon was normal. The kidneys and bladder were healthy. The blood everywhere was in a fluid state.—[*From Report by E. Swift, U. S. A., Medical Director Department Ohio and Cumberland.*]

Case 97.—Musician William Brandt, 17th U. S. Inf.; age 32; was admitted Dec. 11, 1863. Diagnosis—typhoid fever. He had been sick for two weeks and confined to bed for one week: Delirium at night; stupor; tongue dry and coated; skin dry; pulse 98; thirst; occasional pains in abdomen; bowels relaxed. On the 13th the right parotid

gland became painful and much swollen and on the 17th typhoid symptoms were manifested; sordes appeared on the gums; his stupor increased and he was constantly attempting to get out of bed. There was some bronchitis with a little painless expectoration. A red papular eruption was quite distinct. During the next ten days his cough became more troublesome, and on Jan. 6, 1864, jaundice and constipation were added to the symptoms, with increasing stupor, incoherent talking, glazed eyes, thick and tenacious sputa which he was unable to expectorate. He died on the 8th. "The autopsy revealed pneumonia as the cause of death and confirmed the diagnosis of typhoid fever."—*Act. Ass't Surg. Carlos Carvallo, Douglas Hospital, Washington, D. C.*

(B.) Peyer's patches ulcerated and the large intestine also implicated—6 cases.

Case 98.—Private Charles E. Mariner, Co. A, Purnell Legion, was admitted Aug. 16, 1863, having been affected with slight headache and diarrhœa, two or three evacuations daily, for several days. There was no fever on admission, but his tongue was coated and yellow and his eyes jaundiced. Calomel was given as a purgative and small doses of quinine. On the 18th he vomited bile, and next day his tongue was less coated and the sclerotics white. On the 20th signs of prostration were manifested. Delirium occurred on the night of the 22d, after which he failed rapidly and died on the 24th. *Post-mortem* examination eighteen hours after death: The mucous coat of the stomach was softened and almost disintegrated. Peyer's patches were ulcerated and in two places nearly perforated; the solitary glands were greatly ulcerated and in some instances broken down; the ileo-cæcal valve was disorganized, its mucous membrane being converted into a pulpy mass. The rectum was ulcerated in three places, each as large as a dime. A number of the mesenteric glands were enlarged to the size of a pigeon's egg. The liver was pale; the spleen congested and twice its normal size. The left side of the neck was emphysematous and its tissues engorged, the result, probably, of an *ante-mortem* blow.—*Act. Ass't Surg. W. H. Letterman, Douglas Hospital, Washington, D. C.*

Case 99.—Private Jacob Brewer, Co. D, 15th Ohio; age 19; was admitted April 12, 1864, having had, as reported by himself, a severe chill followed by fever. He was at first regarded as suffering from remittent fever and quinine was given; but as the disease after admission seemed of a continued type, with iliac tenderness and dry, dark and fissured tongue, the quinine was omitted and stimulants administered. He died on the 17th. *Post-mortem* examination thirty hours after death: Brain substance white and softer than might be expected from mere cadaveric change; meninges remarkably pale and anæmic; lungs and heart normal; spleen enlarged, very soft and rotten. Peyer's patches and solitary glands within a foot of the cæcum ulcerated, those nearest the valve most affected, the ulcers raised above the surrounding surface, much thickened and covered with mucus and fæces. Colon ulcerated in small spots in its upper part.—*Chattanooga Hospital, Tenn.*

Case 100.—Private Hiram Ginder, Co. B, 57th Pa.; age 17; was admitted Nov. 2, 1864, his previous history being unknown. He was deaf but not delirious; skin yellow, cheeks flushed and murky, respiration hurried, pulse 110, teeth covered with sordes, tongue, lips and gums dry, cracked and oozing blood. On the 5th some cough was noted; the respiration became more embarrassed and the cheeks darker. He died on the 7th. He was treated with turpentine, camphor and spirit of nitre, counter-irritation to chest, beef-essence and milk-punch. *Post-mortem* examination: Pleuritic adhesions on left side; four ounces of dark bloody serum in right pleural sac; congestion of lungs posteriorly and hepatization of part of upper lobe of right lung; heart normal. Mesenteric glands enlarged and filled with dark blood; mucous coat of ileum and cæcum thickened and inflamed; fifteen Peyer's patches, from one-fourth inch in diameter to one and a half by two and a half inches, thickened and some showing commencing ulceration. Spleen large and soft; liver normal in size but yellow; gall-bladder large, containing three ounces of bile; kidneys normal.—*Act. Ass't Surg. Thomas Bowen, Second Division Hospital, Alexandria, Va.*

Case 101.—Private Michael McGowan, Co. A, 154th Ind.; age 18; was admitted May 30, 1865, having been sick for three weeks with a frequent and copious diarrhœa followed by chills and fever, acute pain in chest and dry cough with very little expectoration. On admission he was much emaciated and very feeble; there were large bed-sores over the sacrum, trochanters and angles of the ribs on the right side. His skin was dry and harsh, tongue dry, red and glazed and teeth covered with sordes; he had much thirst, no appetite, pain and tenderness over abdomen, a profuse diarrhœa and hurried breathing. He died on the 7th. *Post-mortem* examination fifteen hours after death: The mucous membrane of the trachea was inflamed and ulcerated. The lower lobe and anterior border of the upper lobe of the left lung, and the upper and lower lobes of the right lung were congested; the middle lobe of the latter was hepatized. The omentum was inflamed and adherent to the abdominal parietes. The spleen weighed twenty-four ounces and was dark and soft. The mucous membrane of the ileum was inflamed and Peyer's patches were ulcerated; there was also some ulceration of the cæcum; the mesenteric glands were enlarged.—*Act. Ass't Surg. S. B. West, Cumberland Hospital, Md.*

Case 102.—Private Austin Seeley, Co. C, 73d Ohio, was admitted Dec. 18, 1862. He had been treated for intermittent fever in the Harewood hospital, Washington, D. C., from November 19. He died Jan. 30, 1863. *Post-mortem* examination next day: Age about 24; body emaciated. Lungs, excepting a slight bronchial inflammation, healthy; heart contained a large white clot in its right cavities; spleen redder than natural and flabby; liver pale brown and on section pale brown with darker intralobular spots; stomach and upper portion of small intestine apparently healthy; agminated glands in the lower five feet of ileum successively and gradually increasing in enlargement; glands in the terminal foot dark-red and bordered by inflamed mucous membrane, those nearest the ileo-colic valve presenting several small ulcerations; solitary glands apparently healthy; colon greatly distended, its mucous membrane redder than natural, but with no inflamed spots, streaks or patches, and with no visible disease of solitary

glands; lymphatic glands of mesentery and mesocolon bluish-black, which color on section formed a circle within the periphery, and under the microscope presented the appearance of exceedingly fine particles similar to the black deposits in the intestinal glands in Chickahominy diarrhœa; kidneys healthy.—[*Specimens* Nos. 99–101, Med. Sect., Army Medical Museum, ulceration of Peyer's patches, are from this case.]—*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 103.—Private James M. Forman, Co. H, 33d Pa.; age 21; was admitted Oct. 2, 1861, having been sick for nine days with pain in the head, back and bones, chills, loss of appetite and strength, diarrhœa, epistaxis, pain in the stomach, nausea and vomiting. A bath was ordered for him with Dover's powder at night. Next morning his face was flushed, eyes injected, pulse 98, full, skin hot, dry and rough, tongue heavily coated, the centre brownish, the tip and edges red; he had anorexia, great thirst, irritability of stomach, diarrhœa, the bowels having been moved four times, tenderness in the right iliac region and four or five characteristic rose-colored spots. The case continued for ten days without much change under treatment by astringents, opiates and whiskey-punch. The nausea and vomiting gradually ceased; some degree of deafness was developed; there was occasional tympanites, and blood appeared in the stools for several days and on the 8th in large quantity. But on the 12th the diarrhœa ceased, the abdominal tenderness was lessened, the tongue became moist and there were indications of returning appetite. About the same time, however, the right parotid gland became inflamed and the face much swollen. There was slight delirium on the 14th, and next day the swelling, which had become erysipelatous, extended over the face, nearly closing both eyes and presenting a small gangrenous spot on the ear and another on the cheek. The patient walked about the ward in high delirium, but towards evening became more quiet. At 10 P. M. he sprang up suddenly, knocked the pitcher containing his punch from the attendant's hand and endeavored to get down stairs. He was got back to bed with some difficulty and immediately thereafter began to fail. At midnight his pulse was rapid and almost imperceptible, his extremities cold, eyes fixed and jaws locked; he took no notice when called or shaken and died at 1 A. M. of the 16th. *Post-mortem* examination: Parotid gland in a state of suppuration; side of face dark-colored and with small patches of gangrene in front of the ear. The mucous membrane of the stomach was congested and softened. The liver and gall-bladder were large but healthy; the spleen congested, enlarged and soft. The ileum was inflamed; its solitary and agminated glands were ulcerated and there was a small perforation in one of the ulcerated patches. The large intestine, from the valve to the rectum, was very much ulcerated. The peritoneum was inflamed; the mesenteric glands enlarged; the kidneys and bladder healthy.—*Seminary Hospital, Georgetown, D. C.*

(C.) Condition of Peyer's patches not stated; the intestines variously affected—7 cases.

Case 104.—John Freeman, Co. B, 12th Tenn. Cav., was admitted May 7, 1864, in a semi-unconscious state; pulse feeble, respiration normal, tongue dry and dark, teeth covered with sordes, skin jaundiced, pupils natural, stools involuntary. He died next day. *Post-mortem* examination sixteen hours after death: Unusual injection of meningeal vessels; hypostatic congestion of lower lobes of lungs; congestion and discoloration of liver; distention of gall-bladder; much congestion of spleen; slight congestion of ileum.—*Act. Ass't Surg. George E. Walton, Hospital No. 8, Nashville, Tenn.*

Case 105.—Private A. C. Truman, Co. G, 152d N. Y., was admitted April 24, 1863. Diagnosis—typhoid fever. Epigastric pain and tenderness but no diarrhœa; vomiting; marked febrile action; tongue coated dark brown; sordes on teeth and lips; pulse 125; urine scanty; countenance pinched; tinnitus aurium. He was treated with quinine, whiskey and turpentine emulsion, and on the 26th was improving. On the 29th blue mass and colocynth were given for constipation and on May 14 sulphate of magnesia. On the 20th he was seized with a troublesome cough and dull pain in the left side of the chest. A few days later diarrhœa set in, the cough continuing, and he died on June 5. *Post-mortem* examination: Right lung hepatized in its lower lobe; left lung collapsed and containing a few tubercles; heart normal. Ileum extensively congested but not ulcerated; liver, spleen and kidneys normal.—*Act. Ass't Surg. John E. Smith, Douglas Hospital, Washington, D. C.*

Case 106.—Private Pleasant Willett, Co. E, 135th Ind.; age 28; was admitted Aug. 19, 1864, having suffered from diarrhœa for some time. His pulse was 106 and his tongue dry and furred but not glazed or cracked. Next day a remission was noticed and on the following day nausea and vomiting were recorded. The diarrhœa became profuse, with dysuria and much abdominal tenderness. He died on the 25th. *Post-mortem* examination eight hours after death: Brain and its meninges normal. Lungs healthy; heart normal, right cavities containing a firm clot. Liver much engorged, eighty ounces; spleen intensely engorged, twenty-seven ounces; stomach distended with flatus and fæcal matter; peritoneal cavity containing one pint of purulent serum; colon somewhat thickened and softened; ileum ulcerated in its lower three feet and with a perforation six inches from the ileo-cæcal valve; bladder congested; kidneys together weighing fifteen ounces.—*Act, Ass't Surg. D. W. Flora, Hospital, Madison, Ind.*

Case 107.—Private Jasper Kemp, Co. H, 11th N. H., was treated in the Fifth Army Corps Field Hospital, City Point, Va., from April 23, 1865, for malarial fever, and transferred May 1 to hospital transport "State of Maine," where his case was diagnosed typhoid fever. He was admitted on the 2d, and two days afterward was seized with acute abdominal pain which increased in severity until he died on the 5th. *Post-mortem* examination: General peritonitis; ulceration of small intestine with seven perforations.—*Campbell Hospital, Washington, D. C.*

Case 108.—Private Robert Alexander, Co. E, 149th Pa.; age 18; was admitted Dec. 7, 1863, as a fully developed case of typhoid fever, the symptoms stated being a dry and red tongue, laboring pulse, scanty and high-colored urine, with great irritability of stomach and diarrhœa. On the 18th there were involuntary stools and more or less stupor and subsultus. He died on the 22d. *Post-mortem* examination nine hours after death: Softening of the coats of the stomach; thickening and softening throughout the lower course of the colon, but no ulceration of the intestinal membrane. Lungs comparatively healthy. Liver normal.—*Third Division Hospital, Alexandria, Va.*

Case 109.—Private Myron Balch, Co. B, 9th Mich., was admitted April 2, 1864, with a fever which presented distinct remissions, and was treated with ten grains of quinine during each remission until the 10th, when he became delirious, had iliac tenderness, diarrhœa and hemorrhagic stools. Stimulants were given and persulphate of iron one grain every two hours. He died on the 16th. *Post-mortem* examination twenty-four hours after death: Brain and its membranes anæmic. Posterior three-fourths of upper lobe of right lung hepatized; left lung normal; heart normal, small white clots in both ventricles. Liver fatty; ileum for twelve inches above the ileo-cæcal valve, ulcerated in patches varying from the size of a pea to that of a dollar, the largest being nearest the valve; colon injected and ulcerated in its upper part.—*Act. Ass't Surg. C. F. Little, Chattanooga Hospital, Tenn.*

Case 110.—Private D. F. McLachlan, Co. G, 14th N. Y., was admitted Sept. 20, 1861. He had been taken sick with a chill followed by severe pain in the head, back and sides, with loss of appetite and strength. On admission his skin was warm and perspiring; pulse 92, quick and strong; tongue glossy and pale, slightly colored brown in the centre and at the base: bowels moved eight times in the twenty-four hours: there was tenderness in the iliac and epigastric regions, with meteorism, borborygmus, epistaxis and rose-colored spots (from twenty to thirty) on the abdomen and chest. He was treated with turpentine emulsion, blue pill and opium, and Dover's powder at night. Next day there was slight mental confusion with ringing in the ears, and his tongue was covered with a grayish fur. An eight-grain dose of quinine was added to the treatment. During the week which followed his condition was one of gradual improvement; the pulse did not rise above 90, the meteorism disappeared, his appetite began to return and his tongue lost its fur, becoming moist and pale, but his bowels continued slightly relaxed notwithstanding the use of opiates and astringents. After this his progress was uncertain; at times he felt pretty well. He was treated mainly with wine and quinine in two-grain doses three times daily, but on October 16 the throat and larynx became congested and he had some bronchitic cough. Blisters were applied to the sides of the neck, the throat was swabbed with a strong solution of nitrate of silver and five grains each of calomel and jalap were given. He did not rest well during the night and next day was pale and weak, hoarse and somewhat deaf; his bowels were moved three times and there was tenderness with tympanites and borborygmus. During the day the bowels were again moved three times. He continued thus for three days. On the 21st whiskey-punch was substituted for wine. On the 23d his expression became anxious, pulse 114, skin hot and dry, the tongue continuing pale and flabby: he had six thin evacuations from the bowels; cough was troublesome and the throat symptoms had become so aggravated that he swallowed with difficulty and could not speak above a whisper. The treatment consisted at this time of chlorate of potash, muriate of iron, beef-tea and whiskey-punch. During the following night his pulse rose to 140, and next day sordes appeared on the teeth. Soon after this he became delirious, imagining that some large animal was in bed with him; that he was in camp, etc. On the 27th, having passed a better night, he was not so delirious, but he looked pale and anxious; his pulse was weak and small, 94; skin warm and soft; tongue pale, moist and tremulous; his bowels were moved involuntarily. At this time there was noted on the skin dark, almost black, slightly elevated spots somewhat larger than split-peas, without accompanying inflammation; those which had arisen more recently were whitish-yellow, being full of purulent matter. On the 28th he was almost unconscious; his pulse weak, small and irritable, 120; skin warm and soft; tongue heavily coated; mouth moist and its whole surface covered with white sticky mucus; gums covered with sordes; one side of the face flushed very dark red; his bowels had been quiet since an injection given on the previous evening, but there was tenderness on both sides; submucous and sibilant râles were heard in both lungs. On the evening of this day he was quite unconscious, his eyes and mouth open, pulse 130, respiration 50. During the night hemorrhage from the bowels took place and recurred on the afternoon of the next day, his pulse meanwhile becoming weaker and breathing more rapid. On the 30th his extremities became cold and at 2 P. M. he died. *Post-mortem* examination: The brain, pharynx and œsophagus were not examined. The lungs were much congested and hepatized. The heart contained fibrinous clots in both ventricles. The liver and pancreas were normal; the spleen soft and somewhat enlarged. The right kidney was small and transformed into a thin-walled cyst containing a yellowish liquid: the left kidney presented several large cavities containing pus. "The small intestine showed that inflammation had been rife there some time ago, but no ulcers were seen that had been formed lately: there were places where large and recently healed sores were evidently indicated." The mucous membrane of the colon was broken by several large ulcers. The mesentery was quite healthy.—*Seminary Hospital, Georgetown, D. C.*

(D.) Condition of Peyer's patches variously stated, but not ulcerated; intestines more or less affected—6 *cases.*

Case 111.—Private Charles Lewis, Co. G, 23d U. S. Colored troops; age 21; was admitted Oct. 20, 1865, on which day he had a chill followed by fever. Dover's powder was given in the evening, but the chill recurring next day quinine in five-grain doses was administered. There was no chill on the following day; but the febrile action continued and increased so that on the 24th his pulse was 120, quick and full, respiration 60, skin hot and dry, tongue furred; and he was weaker, sleepless and slightly delirious. Small doses of eggnog, chlorate of potash and turpentine with Dover's powder were administered. Next day his condition was unchanged: castor oil was given to move the bowels. On the 26th the insomnia and delirium continued; the tongue was dry, brown and coated; the eyes jaundiced; the urine passed involuntarily, staining the linen yellow; the abdomen tender and tympanitic; a thin yellow-colored discharge was procured by the oil. Next day the pulse was not so strong, the tongue contained dry and brown, but the skin became somewhat moist and the patient slept a little. One grain of calomel and two of ipecacuanha were given every hour for six hours, with mustard to the back of the neck and chest. He died on the 28th. *Post-mortem* examination thirty hours after death: The arachnoid over the interpeduncular space was thickened and opaque and there was serous effusion in the cerebral ventricles. The lungs and heart were normal, but there was effusion in the left thoracic cavity. The liver was large, its right lobe honey-combed, full of air and

of a very peculiar appearance, and its left lobe normal in texture but of a yellow color. The pancreas was large; the kidneys normal; the spleen large, soft and dark-colored. The colon and rectum were normal; Peyer's patches were enlarged, as were also the mesenteric glands. [*Specimen* 639, Med. Sect., Army Medical Museum, from this case, shows the honey-combing of the liver by dilated gall-ducts.]—*Surg. E. Bentley, U. S. V., Slough Hospital, Alexandria, Va.*

Case 112.—Private F. Binder, Co. G, 131st Pa.; age 27; was admitted Dec. 30, 1862, with gangrene of both feet after typhoid fever. About eight weeks prior to admission he was attacked with chills and fever, but the disease afterwards assumed the character of typhoid fever. The condition of his feet was supposed to be due to frost-bite while sick in camp. On Jan. 7, 1863, the skin of both feet was reported as blue from the toes to above the ankles, where was an irregular border of redness; below the malleoli the parts were cold and a pin could be inserted without being felt. Lines of demarcation were formed on the 9th just above the malleoli; at this time the patient's appetite was improving and his tongue looking well, but his skin was slightly yellow and he complained of much pain, which he referred to his feet. On the 22d his bowels became loose, there having been five stools during the day, and next day the tongue was somewhat dry. He slept well at night and had no night-sweats, but he lost flesh and continued to suffer from pain in the feet. The right foot separated at the ankle-joint on the 26th, the stump having bled quite freely. Next day both legs were amputated by "Le Noir's" operation, after which the patient reacted fairly and rested well. On the 30th the stumps looked badly and discharged a grayish pus, while vomiting, hiccough and extreme depression were developed. Death took place February 2. *Post-mortem* examination twenty-four hours after death: There were clots in all the arteries of the stumps except the right anterior tibial. On pressing the medulla of the left tibia a yellowish liquid exuded from the vascular foramina in the compact substance of the bone. The brain was healthy. The right lung weighed thirty-three ounces and three-quarters; in its lower lobe was a circumscribed, light-colored, consolidated mass and numerous light-colored points, about the size of pinheads, surrounded by irregular areas of congestion; a portion of this lobe was in the state of gray hepatization. The left lung weighed eighteen ounces and a quarter; on the posterior surface of its lower lobe and in the substance of the upper lobe were a number of discolored spots beneath which the lung-tissue was infiltrated with serum. The heart was pale and contained a small fibrinous clot in the right ventricle. The liver was pale and firm; the gall-bladder small; the spleen weighed seven ounces and a half and was very soft; the pancreas was of a grayish color; both kidneys were small and light-colored. The stomach was large, its mucous membrane slightly softened; the upper part of the jejunum was slate-colored; the whole of the ileum congested and its valvulæ conniventes indistinct; Peyer's patches were slightly thickened and some of them congested. The large intestine was congested.—*Ass't Surg. George M. McGill, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 113.—Private John Frink, Co. K, 40th N. J.; age 19; admitted June 4, 1865. Typhoid fever. Severe diarrhœa, gastric irritability and nervous disorder were the prominent phenomena. Died 23d. *Post-mortem* examination twenty-four hours after death: The lungs were emphysematous; the small intestine much inflamed; the glands of Peyer congested; the spleen normal.——*Third Division Hospital, Alexandria, Va.*

Case 114.—Private Benjamin Brady, Co. I, 24th N. Y. Cav.; age 23; was admitted June 5, 1865, with chronic diarrhœa and intermittent fever. Typhoid symptoms soon became apparent, including delirium and petechial spots on the abdomen. He died on the 14th. *Post-mortem* examination nine hours after death: Body much emaciated. Lungs normal; spleen enlarged and softened; small intestine ulcerated; Peyer's patches much inflamed and corresponding mesenteric glands enlarged and indurated.—*Slough Hospital, Alexandria, Va.*

Case 115.—Private David E. Martin, Co. K, 137th Pa.; age 32; was admitted May 17, 1863, with irregular chills followed by fever from which he had suffered for some weeks. A chill followed by fever and perspiration occurred on the evening of his admission, but next day he was feeling pretty well. This was repeated on the following evening, but on the third day there was no recurrence, quinine having been administered meanwhile. On the 21st he was found for the first time with hot skin, active pulse and headache, his tongue remaining as heretofore, yellow-furred but comparatively clean at the tip. Signs of nervous agitation were also observed, as tremulousness of the lower lip and twitching of the hands. Neutral mixture, cold drinks and low diet were substitued for the quinine. He continued in this condition, some diarrhœa meanwhile appearing, until the 25th, when, having thrown off the bed-clothes during the night, an oppression of the breathing was developed, with sonorous and sibilant râles and some sluggishness of mind. Acetate of ammonia and wine-whey were given with sinapisms to the chest. A blister was applied next day, and on the day following infusion of serpentaria and carbonate of ammonia were given. On the 28th, in view of the continued cerebral disturbance, indicated by heat of head, some confusion of ideas, and injection of the right conjunctiva, a blister was applied to the back of the neck. Next day two or three rose-colored spots of doubtful character were noticed and there was slight abdominal distention. Perspirations were added to the list of symptoms on the 30th and involuntary discharges on the 31st. He died June 3. *Post-mortem* examination next day: Body somewhat emaciated. Heart normal; mucous membrane of trachea and bronchi inflamed, the inflammation extending to the smaller tubes and in several instances to the pulmonary lobules. About four feet of lower portion of ileum showing slight irregularly diffused inflammation; glands of Peyer generally healthy, but a few of the lower ones containing some black deposit; ileum, for eight inches above ileo-cæcal valve, and cæcum intensely inflamed, the mucous membrane liver-colored, thickened and in many places ulcerated, the ulcers varying from the size of a pea to that of the thumb-nail and the largest extending through to the muscular coat; colon distended with air and its mucous membrane here and there slightly inflamed and presenting a few scattered ulcers about the size of pepper-corns; rectum more intensely inflamed and with large and numerous ulcers. Liver large and rather soft; spleen soft and flabby; kidneys darker than usual, their pelves somewhat injected; suprarenal bodies and pancreas healthy. The muscular system and blood appeared to be in sound condition; a large translucent clot occupied the right cavities of the heart.—*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia, Pa.*

CASE 116.—Private Darius Greenlaw, Co. I, 7th Me., was admitted Aug. 10, 1862. He rejected all nourishment, and was sustained by injections of milk, brandy and beef-tea. He vomited frequently a dark-greenish, fetid liquid; there was no fever nor diarrhœa; the alvine evacuations were slight and infrequent. He died September 1. *Post-mortem* examination: Body not much wasted; apparently about 20 years of age. In consequence of the patient having had a swollen eye and bleeding at the ears the brain and skull were examined, but both appeared to be normal. Lungs and heart normal. Stomach much contracted and empty; its mucous membrane inflamed from œsophageal orifice into cul-de-sac and a short distance along greater curvature; rugæ of stomach and summits of valvulæ conniventes of duodenum also inflamed. Ileum presenting four small inflamed patches; upper agminated glands healthy, lower glands thickened and containing black pigment, several of the latter, from one to two inches long, presenting two or three little ulcers not more than one or two lines in diameter; lower solitary glands enlarged and containing black pigment. Mucous membrane of cæcum and of part of ascending colon inflamed and, in a less degree, that of the descending colon; solitary glands blackened.—*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia, Pa.*

Among the one hundred and sixteen cases submitted above there are fifty that, in view of their clinical history, and the information already gathered concerning the symptomatology of the continued fevers, must be regarded as cases of undoubted typhoid. The *post-mortem* observations in some of these instances were insufficient and loosely expressed, but, as in others they were more extensive and entered with precision on the record, there is no difficulty in appreciating the associated anatomical changes. The brain and its membranes were oftentimes found in a normal condition; the thoracic viscera were frequently affected, but in many cases no morbid alteration was discovered in them; the abdominal contents were variously changed from the healthy state. The character of these changes will be examined hereafter on presentation of the remainder of the *post-mortem* records. It is sufficient for the present to point out that an ulcerated condition of the small intestine, particularly of its lower part, and perhaps specifically of that part of its extent which corresponds to the position of the agminated glands, was the only constant anatomical lesion. In some instances the stomach and upper part of the intestinal tract presented traces of inflammation, in others the large intestine bore similar marks; but all these had at the same time an ulceration of some part of the lower portion of the small intestine. Of the fifty cases Peyer's glands were ulcerated in thirty-three; and in seventeen, in which the condition of these patches is not stated, the ileum or small intestine was said to have been ulcerated.

Had the typho-malarial cases reported by our medical officers consisted of typhoid fever modified by the activity of a malarial element, there should have been discovered in all fatal cases the constant anatomical lesion of typhoid fever with such changes in the cadaver as are known to be occasioned by the presence of the malarial poison. It has been seen in a previous chapter that fatal cases of malarial fever presented no constant or characteristic lesion. Inflammatory conditions, observed perhaps more frequently in the small than in the large intestine, were noted, and these had often progressed to ulceration; but as in some cases the intestinal canal was apparently healthy, such conditions could not be regarded as pathognomonic. Ulceration of the intestines, of the small intestine especially, is therefore to be expected in the typho-malarial cases as the constant accompaniment of their typhoid essential and as an occasional result of their malarial complication.

Nevertheless, of forty-two cases recorded as typho-malarial, there were nine in which the patches of Peyer were reported as having been found in various conditions, but not ulcerated, and in which the intestines were more or less affected, but without ulceration of the ileum, except perhaps in two instances. Moreover, of the forty-two cases there were fifteen in which, while the condition of the patches was not stated, the intestines were variously affected, but in only one-third of these is it stated in terms or inferentially that

ulceration was present. The remaining eighteen cases were characterized by ulceration of the patches of Peyer.

Of the nine cases, 84–92, in which the condition of the agminated glands was variously reported, case 84 had the elliptical patches pale, the solitary glands and the rectum ulcerated. These are not the generally accepted lesions of typhoid. In 85 the patches were distinct and elevated and the solitary glands of the large intestine ulcerated, while in 86 the patches were dark-colored and conspicuous and the mucous lining of the small intestine congested. These may be set aside as indicating by the glandular tumefaction the possibility of a typhoid element. In 87–91 the patches presented the shaven-beard appearance; in 87 the solitary glands were prominent; in 89 these glands, near the ileo-cæcal valve, were ulcerated, as was also the colon; in 88 the intestines were congested, and in 90, according to Dr. HARRISON ALLEN, they presented no special lesion other than pigmentation of the patches. In Dr. LEIDY'S case, 91, there was, in addition to deposits of pigment in the agminated and solitary glands, large inflamed and ecchymosed patches in the small intestine and similar but more diffused conditions in the large intestine. In case 92 the record is indefinite; the expression "congestion of the bowels and disorganization of the glands" leaves an uncertainty as to whether the glands of the mesentery or the closed glands of the intestinal mucous membrane were thus affected. Six of the nine cases presumed by the diagnosis to have both a typhoid and a malarial element may thus be regarded as having offered no *post-mortem* evidence of the existence of a typhoid factor.

Of the fifteen cases, 69–83, in which the condition of Peyer's patches was not stated, the small intestine was ulcerated in five instances: In case 74, the patient having been under treatment in hospital for twenty-six days before death, there was congestion and commencing ulceration of the intestines; in 75 the mucous membrane of the small intestine was ulcerated in various parts and that of the large intestine congested and disintegrated; in 77 there were small ulcerations in the lower part of the ileum, and in 82 and 83 this part of the intestine was perforated. Allowing the ulceration in these cases to represent the enteric lesion of typhoid fever, there remain ten cases in which the small intestine was not ulcerated. In 71, 72, 73, 78 and 81 the intestinal mucous membrane was congested, inflamed or softened; in the first-mentioned case the œsophagus, stomach and duodenum participated in the inflammatory action; in 73 the solitary glands were disorganized and in 81 there was also peritoneal inflammation. In 76 the small intestine was congested and the rectum ulcerated and gangrenous. In 79 the ileum was injected and in 80 gangrenous. In 70 the solitary glands were disorganized and the mucous coat of the rectum inflamed and softened. In 69 nothing is said of the condition of the small intestine, possibly because it presented nothing of importance. Negative, as contradistinguished from positive, testimony has its value: The record of case 76 of the paroxysmal fevers does not take cognizance of the condition of the small intestine; but as the diagnosis was remittent fever, few pathologists would doubt its negative testimony as to the absence of ulceration of the ileum. In 69 of the present series the diagnosis typho-malarial sustains rather than invalidates a similar negative evidence. That typhoid symptoms may be present without the co-existence of an enteric lesion is evident from the following case of mistaken diagnosis:

Private William McMillan, Co. I, 15th Ill. Cav.; age 16; was admitted from Washington street prison Feb. 9, 1865, with typhoid fever. He complained of frontal headache and was delirious at times; his tongue was dry and coated with dark-brown fur, teeth covered with sordes, skin hot, dry and sallow, pulse 120 and weak, bowels tympanitic and tender. He died on the 13th. *Post-mortem* examination twenty-one hours after death: The pericardium

was full of serum and flakes of lymph. The left lung was coated with recent deposits of lymph; similar deposits glued together the intestines and other abdominal viscera. The liver was pale. The mucous membrane of the ileum was quite normal.—*Third Division Hospital, Alexandria, Va.*

But even were case 69 thrown out as indefinite in its evidence, there would be no modification of the general conclusion drawn from this series of cases, to wit: that among them are to be found cases in which the symptoms warranted a typho-malarial diagnosis in the absence of the lesion considered pathognomonic of typhoid fever.

This conclusion is sustained by an examination of the *post-mortem* records of those cases which, though recorded as typhoid fever, showed by their clinical history that their course was probably modified by the concurrent action of the malarial poison. Twenty-four such cases have been submitted,* in eleven of which the patches of Peyer were referred to definitely as ulcerated. In six of the twenty-four cases, 111–116, the condition of these glands was mentioned, and if the enlargement in 111, the thickening and congestion in 112, the inflamed condition with ulceration of the small intestine in 114 and the commencing ulceration of the pigmented glands in 116 be regarded as representing the anatomical lesions of typhoid fever, there remain two cases in which those lesions cannot be recognized. These are 113, in which, although the patient was under treatment in hospital for twenty days prior to death, the patches of Peyer presented no other characteristic than a participation in the general congestion of the small intestine, and 115, in which, although, according to the testimony of Dr. LEIDY, the ileum near the valve and the cæcum beyond it were intensely inflamed, the patches were healthy except that a few of the lower ones contained some black pigment. The condition of the agminated glands was not stated in seven, 104–110, of the twenty-four cases. Four of these may be set aside as presenting probable typhoid lesions, but the remaining three cannot be so regarded. In 104 the ileum was but slightly congested; in 105 it was extensively congested but not ulcerated; and in 108 the mucous membrane of the stomach was reported softened, of the lower part of the colon thickened and softened, but no mention is made of the condition of the ileum or small intestine, and it is hardly admissible to suppose that the characteristic lesion, in a case admitted as fully developed typhoid fever, would have been omitted from the record while details were given of other and apparently less important lesions.

It is evident from these records that among the fatal cases reported as typho-malarial were some which, while presenting the inflammatory conditions recognized as the frequent

* Among the forty-two cases entered as typho-malarial and the twenty-four which, although showing in their clinical history a probable malarial complication, were nevertheless regarded as typhoid, are to be found those of which Dr. WOOD was spoke as follows in his remarks on Typho-malarial *Fever, before the International Medical Congress*, Phila., 1876, pamphlet, pages 34-35: "In the group of cases in which the malarial phenomena predominated the disease began as a simple intermittent or remittent fever, of quotidian, tertian or quartan type, the last [illegible] tertian; but after a week or ten days the fever assumed a more or less simply typhoid type, with many of the [illegible] fever, such as diarrhœa, abdominal tenderness, meteorism, muttering delirium, subsultus tendinum, dry, brown tongue and the like. But even when the typhoid phenomena were most pronounced some of the most characteristic of them were often wanting. Thus, sometimes there was no diarrhœa at all, but constipation instead. The characteristic [illegible] tenderness and an icteroid hue of the countenance were [illegible] terminated favorably, especially, as I think, because [illegible] frequent accident during the convalescence. And, just because [illegible] of this kind which I have been able to collect is much less than in cases of the severer [illegible] number of autopsies of cases of this kind, in which diarrhœa had been present during [illegible] had strikingly resembled typhoid fever, but in which dissection showed [illegible] of inflammation, scattered irregularly throughout both small and large intestines, and [illegible] deposits, were the characteristic lesions. The solitary glands of the small intestine appeared as little projecting tumors the size of pinheads, which often had constricted necks, so that they resembled tiny polypi. The agminated glands of Peyer, slightly prominent, were often the seat of pigment deposit, which gave them the so-called shaven-beard appearance. Sometimes the villi of the small intestines were hypertrophied; sometimes they had pigment deposits at their apices. In the large intestine the slightly swollen solitary glands were often the seat of pigment deposits, seated either in the glands alone or sometimes also in the surrounding mucosa, in which case the central dot of pigment was surrounded by a little pigmentary ring. When the fever had supervened, as often happened, upon a chronic flux, or when [illegible] lesions of the [illegible] sequence and had been the immediate cause of death, the characteristic follicular ulcerations of the colon or the phenomena of the diphtheritic process complicated the picture. Great enlargement of the spleen and congestion of the liver, with or without fatty degeneration, were frequent concomitants."

attendant of acute malarial poisoning, did not have associated with them the morbid condition which daily experience shows to be the invariable accompaniment of typhoid fever. Certain cases of the paroxysmal fevers, as for instance 58, 63, 81 and 82, indicated that a clinical history suggestive of typhoid fever might be presented without the discovery of typhoid lesions on *post-mortem* examination. This indication has been fully sustained by the records just submitted. They demonstrate that there were sometimes developed in the progress of a malarial fever, and in the absence of the local intestinal lesions characteristic of typhoid, certain symptoms which are so generally the manifestations of typhoid fever that they are technically known as typhoid symptoms. As these cases are too numerous and well authenticated to be disposed of by the assumption that they were exceptional cases of mistaken diagnosis, it follows that our medical officers applied the term typho-malarial to cases which Dr. WOODWARD did not have in view on its introduction. Adynamic malarial remittents swelled the list of febrile cases reported as typho malarial, and to a greater extent than would be supposed from the small number of *post-mortem* records that support this statement. Most of the recorded cases presented the characteristic lesion of typhoid, or such ulcerative changes in the mucous membrane of the small intestine as might be claimed to represent the typhoid lesion, although malarial fevers are also productive of such changes. But it has already been shown that malarial cases rarely reached the general hospitals in the rear, where facilities existed for *post-mortem* observation and record. Such cases occurring at the front recovered under the influence of quinine, or died, if the disease was pernicious, before reaching the general hospitals. Hence the paucity of malarial changes as compared with the frequency of typhoid lesions in the recorded cases. Had the *post-mortem* records of typho-malarial fever been preserved in the field-books of the regimental surgeons as in the case-books of the general hospitals, it is highly probable that the number of cases presenting lesions not definitely typhoid would have been largely increased.

When anomalous febrile cases were first observed in the autumn of 1861 they were viewed by our medical officers as remittent fevers which, owing to depressing influences operating on the newly levied troops, tended to assume a continued type and adynamic character. This is expressed in a large number of sanitary reports furnished at that early period of the war, a few of which are herewith submitted:

Surgeon J. M. CUYLER, *U. S. A., Fortress Monroe, Va., August* 17, 1861.—Continued fever of malarial origin, by many here called "typhoid," is the most formidable disease we have to contend with; the number of fatal cases has as yet been comparatively few, but patients are long in recovering their strength.

Surgeon ISAAC J. CLARK, 12*th Pa. Reserves*.—Our camp at Tennallytown, Md., in August, 1861, was on a hillside with a gravelly surface but a wet clayey subsoil, near a piece of low ground suitable for the generation of malaria. The prevailing disease was remittent fever, which almost invariably in a few days changed to a mild typhoid fever; most of the cases recovered, but convalesced quite slowly.

Surgeon A. P. FRICK, 103*d Pa.*—During our sojourn at White Oak Swamp, June 1862, there was much and serious sickness, principally typhoid fever, or we may more properly say remittent fever of a typhoid form. The prolonged exposure, continued watching and great mental depression after the battle (Fair Oaks), united with the malarial influences of the region in giving a low form to disease and in making cases alarmingly fatal. Stimulants, quinine, chlorate of potash and opium were the remedies chiefly relied on.

Surgeon SAMUEL G. LANE, 5*th Pa. Reserves*.—Disease during the winter 1861–62 was of a decidedly typhoid type, death being usually sudden and from local inflammatory complications. We had but few cases of enteric fever; all others were purely miasmatic. The treatment was simple: Depletion, even local, was pernicious; quinine in full and repeated doses, stimulants, nutritious diet and cleanliness constituted the general treatment, with oil of turpentine, nitrate of silver, acetate of lead and opiates for diarrhœa, which was a usual accompaniment, and dry cupping, blistering and counter-irritants to subdue inflammatory action.

Surgeon S. N. SHERMAN, 34*th N. Y., Senecca Mills, Md., Sept.* 30, 1861.—The 34th N. Y. was mustered into service June 15 at Albany, N. Y. It reached Washington July 6 and went into camp on Kalorama heights. There it remained

until the 30th, when the sick were ordered to the Georgetown hospital and the regiment to Seneca Mills, Md., where it arrived on August 2. While encamped at Kalorama the diseases were almost exclusively diarrhœa and rheumatism, but since it occupied its present location there have been superadded intermittent and remittent fevers, which in a few cases have assumed a typhoid type. I was detained at Washington and did not rejoin my regiment until August 11, when I found it encamped in the Seneca bottom, half a mile from the Potomac. Immediately the camp was removed to an elevation half a mile from and one hundred and fifty feet above the creek and about the same distance from and height above the Potomac. All possible attention has been paid to police regulations. The location is airy and descends in all directions. The water from a spring adjacent is both pure and abundant. The rations furnished are sufficient in quantity and of unexceptionable quality. Ardent spirits are excluded. Among the duties assigned the regiment is that of guarding the river for four miles above and below the camp: this has required the constant services of two companies, with generally four on picket on the banks of the river or the tow-path of the canal. Chills and fever have resulted, but only among those doing guard duty on the river; and of those attacked few fail of a rapid recovery when quinine is liberally used and strict confinement to camp enjoined. As the frosts of autumn approach the number of attacks decrease and the recoveries are more speedy.

Ass't Surg. S. COMPTON SMITH, *4th Wis. Cav., Relay House, Md., Sept.* 30, 1861.—We had been in our present encampment but a few days when fevers of a remittent and typhoid type supervened, three patients having died of the last-named disease. Until the present time these fevers, accompanied with the various forms of intermittent, have been attendant upon us, latterly, however, assuming more the forms of remittent and tertian. They are generally controlled by the sulphate of quinia administered early in from ten to twenty-grain doses at intervals of two or three hours and preceded by the usual cathartics. At this date our hospital wards are filled with patients laboring under the two last-named forms of fever with a few cases of dysentery.

Surgeon D. WADSWORTH WAINWRIGHT, *4th N. Y., Havre de Grace, Md., Sept.* 30, 1861.—On August 13 the regiment was ordered to guard the bridges on the Philadelphia, Wilmington and Baltimore Railroad: Company H at Back river, B and I at Gunpowder river, E and D at Bush river, K at Perrymanville, A, C and G at Havre de Grace and F at Perryville. We have had many cases of malarial fever, mostly from Back, Gunpowder and Bush rivers; some of these were intermittent, others remittent, and all had a tendency to a typhoid state. Most of them yielded readily to treatment, ten grains of calomel with castor oil followed by quinine, twenty-four grains in twenty-four hours.

Ass't Surg. HENRY S. SCHELL, *U. S. A., on the condition of the Light Batteries of Fitz-John Porter's Division, Hall's Hill, Va., Sept.* 30, 1861.—Fort Corcoran is situated about one-fourth of a mile from the Potomac river on the Virginia side, opposite Georgetown, D. C. It is upon the brow of the first hill from the river, and is a recently constructed earthwork exposing a large amount of freshly upturned and moist soil to the action of the sun. Besides this, the woods which at one time intervened between its site and the marsh below were felled during the summer in the construction of abatis. Hence miasmatic diseases are prevalent and characterized to some extent by a typhoid tendency.

Surgeon N. F. MARSH, *4th Pa. Cav., Washington, D. C., Dec.* 30, 1861.—During the past two months the tendency of every disease has been to assume a typhoid character; a simple attack of diarrhœa would in twenty-four hours render a vigorous man perfectly prostrate, and he would then present all the incipient symptoms of typhoid fever.

Surgeon JOSEPH P. COLGAN, *59th N. Y., Camp Sherman, Fort Good Hope, D. C., January*, 1862.—The weather for the season of the year has been favorable, yet the temperature is variable and the transitions quick, which is productive perhaps of more respiratory disease than a colder and less variable season might be. Coughs and catarrhal affections have prevailed to a considerable extent in consequence. Another cause of the prevalence of such complaints is found in the fact that the Sibley tents in which the men sleep are furnished with small sheet-iron stoves of poor quality, easily and quickly heated and as quickly cooled again, and unless they are constantly supplied with fuel the temperature speedily falls to a low point, so that it is all the time too hot or too cold. Previous to day-break, when the mercury ordinarily falls lower than at any other hour and the men are all asleep, the fires die out, and as the top of the tent is open to the atmosphere, dew, frost, snow or rain, as the case may be, causes surgeon's call to be well attended with invalids complaining of pains, coughs, colds, fevers, etc. Some of the stoves have pipes reaching out at the top, but others, and these the majority, have pipes reaching but half way up, so that the smoke assending deposits soot on the slope of the canvas from which at every blast of the wind it is shaken off, covering the faces and hands of the men, adhering to their clothes and giving them, previous to ablution in the morning, a dirty and unbecoming appearance. This is, however, unavoidable when troops have to take up winter quarters in tents, sleeping on the ground. I may as well say here that men so situated are too scantily supplied with covering, each man being provided with but a single blanket for covering and protection from the cold and damp ground. This scanty covering compels them always to sleep in their clothes, the overcoat being the only garment removed, and this only to be converted into a bedcover or quilt. It must not be forgotten that when they retire to their canvas quarters their clothes are often wet. There can be no question as to the consequence of men sleeping in garments and in such quarters, huddled together in crowds of twenty to a tent; that it tends to demoralize them to a certain extent I entertain no doubt, and think it should be practiced only when unavoidable. As a consequence of these conditions our prevailing diseases are affections of the respiratory organs and bowels. Intermittents are seldom well marked, but remittents are frequent and various in their character from the most simple to the most complicated, some soon assuming the typhoid type; for which reason they have been by many surgeons named "typhoid fevers," so that nearly all have been compelled to adopt the nomenclature, while many are of the opinion that the disease is "bilious remittent," which sometimes, of course, runs into continued and congestive fevers. The patho-

logical conditions are so various that no organ escapes being involved in all cases. Quinine and stimulants are necessary and in very large doses; in a few instances the disease refused to yield to these remedies until the system was brought slightly under the influence of calomel.

Act. Ass't Surg. EDWARD T. WHITTINGHAM, *on the condition of the Artillery Brigade of Kearny's Division, near Harrison's Landing, Va., June* 30, 1862.—I joined the command May 17, at Cumberland Landing on the Pamunkey river. Since that time we have been constantly exposed to the fatigue of marching and the emanations from swamps lying on our route. We have also been obliged to use water so muddy and impure as to be unfit for drinking. These causes, in conjunction with the previous exposure of the troops in the marshes about Yorktown, produced a general tendency to malarial fevers and dysenteric affections severe in their type and exceedingly unmanageable. Quinine in very large doses and opium have been the remedies employed. Though the mortality has not been large, yet the average duration of sickness has been extremely long.

Surgeon J. M. BOISNOT, *U. S. V., Gaines' Mill Hospital, near Mechanicsville, Va., June*, 1862.—The seven cases of typhoid fever which we report were of unusual severity, four of them original and three sequences of remittent fever. All diseases in the army, of the class of fevers particularly, have a typhoid tendency. I believe that circumstances producing frequent and rapid changes in the temperature of the body, as a rapid march and then a halt, a hot and quickly eaten meal of soup and coffee, etc., then lying down on the cool ground, have mainly to do in bringing about this condition. My plan of treatment in the seven cases treated in this hospital was to give strong but digestible food and stimulants in small quantities, administered nearly every hour; six recovered and one died.

Surgeon DAVID MERRITT, 55*th Pa., Edisto Island, S. C., June* 30, 1862.—Edisto Island, upon which this regiment is stationed, abounds in swamps or salt-water marshes. The climate is warm and generally sultry, but modified by a cool sea-breeze in the afternoon from North Edisto river. The prevalent diseases are bilious remittent fever, which tends to assume a typhoid character, and dysentery, bilious in character and mild, easily managed by the prompt use of mercurials followed by full doses of saline cathartics. The duties of the troops are light; they are quartered in tents and the sick in hospital tents. The diet, clothing and general habits of the men as to cleanliness, temperance, etc., are good. The water, however, is bad, being generally sulphurous.

Surgeon A. B. SNOW, *N. Y. Engineers, Hilton Head, S. C., June* 30, 1862.—During the winter the fevers were of an intermittent character, but since the warm weather has set in they have assumed more of a bilious typhoid type.

Surgeon ALEXANDER M. SPEER, 7*th Pa. Cav., Bardstown, Ky., Feb.* 3, 1862.—The diseases to which the men were most susceptible were a remittent form of fever with a strong tendency to assume a typhoid character, diarrhœas arising from change of food and water, and mild bronchial affections, which have been, however, with a few exceptions, amenable to treatment.

Surgeon W. J. CHENOWITH, 35*th Ill., near Rolla, Mo., Dec.* 1, 1861.—Here also [Otterville, Mo.] was our largest list of intermittents and remittents, and to add to our trouble we had no quinine nor could we procure any. Frequent requisitions were made on St. Louis, and in the space of two weeks as many as five messengers were dispatched for it; but as the medicine had been forwarded to us by the purveyor it was supposed we would receive it. This supply, however, was lost, and we were compelled to resort to arsenite of potash and other antiperiodics, but our sick-list steadily increased from fifty a day up to one hundred and fifty. Many cases assumed a typhoid type, and two men died. A marked case, showing the efficacy of quinine in the arrest of the disease, was exhibited in the person of Lowery, Co. E: One of our officers on rejoining the regiment brought with him a solution of quinine. This we concluded to give to any of the graver cases that still showed a remission. Lowery had a dry cracked tongue, frequent pulse, and his fever manifested every indication of falling, as in other cases, into the continued form. We gave him twenty grains of quinine and repeated the dose during the next remission, with the result of arresting the disease.

Surgeon JAMES L. KIERNAN, 6*th Mo. Cav., June* 30, 1862.—The prevailing diseases in the Southwest are bronchial and thoracic affections, typhoid fever in the low alluvial districts, and in the army, amongst those who have seen service, that peculiar train of symptoms, induced by malaria, exposure and privations and characterized by lassitude, emaciation and a low irritative fever, which can scarcely be classified. I observed the same phenomena amongst the troops comprising the Army of the Potomac last year, but not to the same extent.

Typhoid fever of undoubted character broke out in many of the regiments soon after their organization, and it is highly probable that many cases of this disease were mistaken for adynamic developments in malarial cases where remittents and intermittents were the prevailing fevers. It is equally probable that during these regimental epidemics adynamic remittents were occasionally classed with the prevailing fever. After the presentation of so many cases of undoubted typhoid from the case-books of the Seminary hospital and the *post mortem* records of various general hospitals it is needless to occupy space with a selection of reports indicating the presence of this fever. Some extracts showing its prevalence will be embraced in the section discussing the etiology of the continued fevers.* Brigade Surgeon DAVID PRINCE, under the impression that the Army Medical Board of which Surgeon

* See *infra*, p. 486 *et seq.*

McLaren was president had concluded, as the result of its investigations, that there was no typhoid fever in the army,* filed, in protest at the office of the Surgeon General, a detailed account of cases of this fever that had been treated in his command.

But although typhoid fever was recognized by so many regimental medical officers, it was not held by them to constitute the prevailing army fever. Surgeon Zenas E. Bliss, U. S. V., appears to have been the only officer whose recorded experience was opposed to the general view. While on duty with the 3d Mich. at Yorktown, in 1862, he had a few cases of intermittent and remittent fever and about forty cases of typhoid. These were treated at a hospital where were also many fever cases from other regiments, and nearly all were regarded by Dr. Bliss as cases of typhoid, although some of them might easily have been classed as low remittents. Death was caused by hemorrhage in many instances, and in six cases in which *post-mortem* observations were made the glands of Peyer were ulcerated.†

Even at this early date, however, cases of true typho-malarial fever were observed and reported in general terms. When the troops had been exposed—using the language of the accepted theory of a distinct pathogenesis for the typhoid and remittent fevers—to the causes of both these morbid conditions the resulting epidemic presented such a complexity and variability of symptoms that an accurate diagnosis could not be expressed by a term in which but one of the etiological factors was represented. Surgeon James King, 1st Brigade Pa. Reserves, in a published article,‡ dated Dec. 23, 1861, on the sanitary condition of the troops in his command, says that it was impossible to classify either as pure malarial or pure typhoid all the cases of fever that occurred. He regarded them as mixed affections, combining in varying degrees the characteristics of both the diseases named: In some the diagnostic symptoms of malarial fever predominated, in others those of the typhoid affection, while in others again there was such a blending of symptoms that it was difficult to say which was the prominent disease.

Similar views had already been expressed by some regimental medical officers in their sanitary reports.

Surgeon James Collins, *3d Pa. Reserves, Camp Tennally, Va., Dec.* 31, 1861.—During the month of October the health of the regiment continued tolerably good. There was, however, a slight and general increase of sickness, and the type of disease seemed to indicate a malarial origin. Early in November diseases of an undoubted malarial nature began to assume a more malignant type than had been noticed since the regiment had been organized. The prevalent diseases were remittent and typhoid fever, catarrh and acute bronchitis. Cases of typhoid fever have without doubt many if not all the symptoms of the same disease as seen in New England and Pennsylvania; yet, as seen in this camp, malarial influence exercises a modifying tendency upon the disease. In some cases the line between intermittent and typhoid could not be sharply drawn. In all cases quinia has been given with advantage; it has seemed to produce peculiarly happy effects even in those of a marked typhoid type.

Surgeon W. H. Thorne, *12th Pa. Reserves, Camp Pierpoint, Va., Nov.* 1, 1861.—The camp of this regiment is located on the slope of a hill well adapted for surface drainage; a streamlet drains the bottom of all superfluous water and carries off the refuse matter of the camp. The soil is clay mixed with pebbles and does not retain moisture to any great extent. The prevailing diseases are remittent and typhoid fevers, with some dysentery, but almost no diarrhœa. The former fever scarcely ever occurs as pure remittent, being rather of the asthenic type and not so amenable to antiperiodics.

Surgeon Wm. Faulkner, *83d Pa., Hall's Hill, Va., Dec.* 31, 1861.—It was during the first days of November that typhoid and remittent fevers began to show themselves, and indicated a most important change in the type and character of disease. The worst cases were complicated with extensive disease of the mucous membrane, which called for the early and free use of quinine and alcoholic stimulants. They were doubtless of a malarial origin and contracted perhaps when in camp near the river in the latter part of September.

Surgeon David Minis, *48th Pa., Camp Winfield, N. C., Dec.* 31, 1861.—The 1st of October, 1861, found us encamped at Camp Hamilton, near Fortress Monroe, and laboring under the usual epidemic of diarrhœa and dysentery to which

* For report of this Board, see *infra*, page 365.

† See his report, p. 86 of the Appendix to the first part of this volume.

‡ *Medical and Surgical Reporter*, Philadelphia, Pa., Vol. VII, p. 306.

new troops are liable. These diseases were at this time almost universal but manageable, no case terminating fatally. After their subsidence the health of the troops was excellent and continued so until the last week in October, when an epidemic of catarrh set in, having its origin in the exposure incident to the service during inclement weather. This disease, although very general in its manifestations and exceedingly painful in its symptoms, yielded readily to treatment. During the first week of November typhoid fever made its appearance, following immediately in the footsteps of the epidemic catarrh, many cases of the latter appearing to glide by almost imperceptible gradations into a typhoid condition with all the physical signs of the specific fever. On the 11th the regiment left Camp Hamilton and next day encamped at Fort Clark, near Hatteras Inlet. Immediately after our arrival numerous cases of typhoid fever, which had been in their incipient stage on leaving Camp Hamilton, became fully developed, and being modified by the miasm of the island assumed a malignant and unmanageable aspect such as I had never witnessed in any cases of the disease previously falling under my observation. In fact in these cases typhoid fever, epidemic catarrh, remittent and intermittent fevers were so commingled and mutually complicated one another as to render the diagnosis obscure, the treatment unsatisfactory and the prognosis unfavorable. The most striking characteristic of this epidemic has been, in the graver cases, the almost total absence of tongue-symptoms. In some, and those terminating fatally in a few days after the access of the disease, there was no abnormal appearance of the tongue during the whole progress of the attack; while those cases in which the tongue became heavily coated, dry and red, made good recoveries. Between the 1st and 20th of December the regiment was removed from Fort Clark to this station, Camp Winfield, about four miles north of Fort Clark. The general health of the regiment is good at present. Either from the prevalence of cool weather for the last two weeks or because the troops are becoming acclimated, diseases having a malarious origin have almost disappeared. We have but few cases of severe aspect now under treatment.

No doubt the opinion that the fevers then prevailing in the army were adynamic remittents was based primarily on etiological and clinical considerations,—the absence of a special typhoid infection and of symptoms indicative of a typhoid lesion, the presence of malarial influences, the sequence of the adynamic or so-called typhoid symptoms to an intermittent or remittent attack and in many instances the notable efficacy of quinine. But since deaths were unfortunately of frequent occurrence it must be concluded that the general opinion did not continue long without support from *post-mortem* observations.

The only official investigation into the nature of the fevers which prevailed in our camps was made when the Seminary hospital was receiving and treating the typhoid cases that have been presented in a previous section, *i. e.*, at a time when typhoid fever was unusually prevalent among the troops. A Board specially instituted to ascertain whether the existing fever was to be considered "an intermittent or bilious remittent fever in its inception assuming in its course a typhoid type, or a typhoid fever primarily," proceeded to the field, and as the result of personal observation and inquiry concluded that, although a certain number of cases of ordinary typhoid existed in the army, the large majority of the cases were bilious remittent fevers which "had assumed that adynamic type which is present in enteric fever."

The report of this Board is as follows:*

* Some official documents bearing on the nature of the fevers that prevailed in the Hooghly District during the years 1870–73 have been published in the *Indian Med. Gazette*, Vol. IX, 1874, p. 74 *et seq.* These are of interest, as the question at issue was similar to that submitted to the Board mentioned in the text. Whole families, we are told, were prostrated at the same time by the Hooghly fever; from twelve to eighteen or more members of joint families would be laid up at the same time, though not all suffering from the same type of fever. For instance, of eighteen cases three would present the symptoms of typhoid, four or five of remittent, five or six of intermittent and the remainder of common continued fever. JAMES A. GREENE, Civil Medical Officer, Serampore, having seen and treated at least 2,000 cases during the epidemic in the town and suburbs under his care, arrived at the conclusion that "the fever we have to deal with is typhoid, complicated, no doubt, with malaria, but the first outburst in any place is typhoid, and this is the formidable fever which kills or leaves its victims so prostrated that they suffer thereafter for months and years from relapses of malarious fever ending in enlargement of the spleen, liver, etc." Unfortunately in Dr. GREENE'S practice *post-mortem* examination was never allowed owing to caste prejudice. His reports on these fevers were sent to Surgeon-Major NORMAN CHEVERS, with a request for his opinion on the subject. In reply this officer refers to the want of precision involved in the use of the word typhoid. "Having paid considerable attention to the recent discussion upon typhoid fever in India, it has appeared clear that much confusion and vain dispute would be avoided if we strictly confined ourselves to the designations 'paludal fever' and 'enteric fever,' never again using the word 'typhoid.' Every practitioner is aware that, in Bengal, cases of cholera and remittent fever frequently take on a condition so 'typhoid' or typhus-like in its character that no physician, seeing a case for the first time, could immediately determine, by the symptoms alone, whether it was one of true typhus or (when, as frequently happens in the congestive, paludal, remittent of the cold season, there is bowel complication) one of the true enteric fever as described by JENNER." Dr. CHEVERS then discusses the typical cases given in the reports, showing that the "patients may have been the subjects of 'typhoid'—that is, true enteric fever, but Dr. GREENE has not at all proved that they were." He acknowledges that enteric fever has taken a defined position among the diseases of Bengal, but claims that this malady has never during the last eleven years become at all extremely prevalent in Calcutta, although a typhus-like fever (often attended with diarrhœa), demonstrably of paludal origin and amenable to the antidotal action of quinine in nearly all but the moribund cases, has been almost daily among the chief subjects of his clinical practice. "Dr. GREENE has shown that cases somewhat resembling enteric fever occur in these districts [Burdwan, Hooghly and Serampore], but such cases also occur in Calcutta, where these causative elements are nearly equally rife. Still, when thoroughly sifted, very few of the multitude of grave Calcutta fever

HEADQUARTERS OF THE ARMY, ADJUTANT GENERAL'S OFFICE,
Washington, Dec. 6th, 1861.

SPECIAL ORDERS,
No. 337.

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6. A Board to consist of Surgeon A. N. McLaren, U. S. A., Surgeon Burgess, U. S. Volunteer service and Asst. Surg. M. L. Lyman, U. S. Army, is hereby convened for the following object: To visit as many of the camps in the vicinity of Washington as they may consider necessary to obtain sufficient data to make a report to the Surgeon General on the character of the fevers treated by the Medical Officers of the Brigades and Regiments of "Typhoid Fever," and as far as practicable the causes of its alimentic type and whether it is to be considered an intercurrent or idiopathic continued fever in its inception, assuming in its course the typhoidal type or a typhoid fever primarily.

The Board will be organized in the manner and reported to the President so as least to interfere with the other operations of the service. The junior member will act as recorder.

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By command of Maj. Gen'l McClellan.

(Signed) L. THOMAS,
Adjutant General.

In pursuance to the above order the Board convened at Monday the 16th day of December, 1861, at the quarters of Brigade Surgeon Lyman and proceeded to examine the brigade and regimental hospitals of the division commanded by Brigadier General Fitz-John Porter with a view to the ascertainment of such cases as might exist, and to the comparison of such symptoms and conditions of the disease as at present prevailing with a similar affection that had already occurred and had been reported as typhoid fever.

The regimental hospitals of the 16th and 25th New York, the 9th Pennsylvania, the 18th Massachusetts and the 2d Maine regiments were successively inspected with the brigade hospital connected with General Morell's brigade; but few cases were discovered which could be designated accurately as of a typhoid character. Of the cases so marked the majority had been returned from hospitals as suffering from bilious remittent fever which in its progress assumed the ataxoid type of what known to those whose experience in malarial fevers has been gleaned in the South. No case of enteric fever was observed. The disease was evidently of malarial origin, and was so considered by the medical officers. Such general rule in their treatment, quinine given in large doses in the remission, with mercurials as prescribed, had the effect of breaking the fevers. The congestive state only appeared as a result of a continuous neglect of hygienic precautions when in camp or on the march they had been exposed to unusually severe and prolonged rains. In the cases presenting this ataxoid type which the Board examined, although symptoms of prostration and sinking were present, together with the general tongue, retraction of sordes on the teeth and gums and subsultus tendinum which characterize the state, still the absence of any enteric symptoms and of the mucous ronges, which are the most invariably constant symptoms in true typhoid fever, as well as of any pulmonary complication, was sufficient to warrant the Board in recording that the cases before them were not of the enteric fever so common in the Northern States and generally known as typhoid fever, while the previous location of the regiments in regions unfavorably contrasted them in predisposing malarial origin to the febrile cases brought to their notice. The surgeons and hospitals of this division to the extent of their opportunities have been extremely neat and clean and are deserving of the highest commendation. It must be confessed as a medical deficiency, which it would be scarcely safe to take as a precedent for any similar mode of action, that the camp or march police regulations had not been enforced and which, in connection, was in the extremely rainy conditions, where the most sanguinary sanitary state and, at the period of the visit of the Board, had cost a considerable ill portion of the hospitals. It is but just to the surgeon of this regiment to state that he had already instituted measures which in a very brief period would cause the camp to compare favorably with any other in the division. There was observed in one of the regimental hospitals a number of cases of congestive symptoms of the most unyielding character from fever outwardly present in others where no such primary pause existed but where the patient was in an adynamic condition.

On the 18th of December the Board again convened and visited the divisions commanded by Gen'ls McCall and Smith. Many cases found were cases of typhoid fever with the entirely real preliminary symptoms which distinguish [illegible] the Northern but as the two regiments of this force which had encamped [illegible] arriving from the encampment [illegible] of the eight lung set in. Some might consider this a primary feature in the case, I recognized it as a [illegible] fever of this cold weather. The daily evening temperature was 105; 103; 100; 102; 99; 101; 100, sordes [illegible] 101, rather constipated; 99 m., 100.3 e.; 101 m., 100 e., tongue, lips and teeth dry, loose yellow stools; [illegible] of the consistence and appearance of thick dal, no gurgling in the iliac fossa; 102; three stools; 98 m., [illegible] contain blood or mucus. The character of the moderate head symptoms, the range of the temperature [illegible] did not indicate enteric fever; and yet I could not feel quite satisfied on this point until I had

of the regiments during the autumn months in a malarious district. In Gen'l Smith's division nearly all diseases assumed a typhoid type, which was attributed by the surgeons to ochlesis or crowd-poisoning produced by the overcrowding of men in their quarters, and also to the fatigue induced by excessive drilling and the unnecessary length of time which the men are occasionally required to pass on duty, as well as the depressing influence of camp life on persons not habituated to it. In Gen'l Hancock's brigade a number of cases of typhoid fever had occurred which Brigade Surgeon HAVEN attributed to causes belonging to the men themselves and not to the condition of the camp. This brigade is composed of Vermont troops, who are the most thoroughly provincial of any in the service, and who, accustomed to their native mountains, feel acutely the depressing influence of nostalgia and malaria when absent from them and on this account, probably, are more liable to disease of an adynamic type than those from other localities. The same fact is noticed among those Pennsylvania troops coming from the mountainous region of the Alleghanies. In the division commanded by Gen'l McCall a number of cases of typhoid fever were reported, but, as in Gen'l Smith's division, the majority of the patients were laboring under bilious remittent fever; some cases of gastro-enteric fever were found. As want of time precluded the Board from examining thoroughly all the hospitals of this division, the following interrogations were propounded to the various medical officers, the answers to which will be found appended, viz:

1. What number of cases of bilious remittent and of typhoid fever have occurred in your regiment?
2. Is the so-called typhoid fever the typhoid fever of the North or is it of malarial origin?
3. What do you consider to be its cause?
4. Describe the symptoms of the fever occurring under your care?
5. The treatment adopted?
6. The locality of the regiment before the appearance of the disease?
7. The percentage of the disease?
8. Have any cases of gangrene of the toes been observed as the result of fever or otherwise?

From the information afforded by the answers to these questions the Board found nothing to justify an opinion that typhoid fever existed as an epidemic or otherwise than in a very small proportion in this part of the army. The majority of cases of fever were clearly of malarial origin and in some cases from the causes above enumerated they assumed a typhoid type. The gangrene of the toes which had been observed in other divisions was found here also from the same supposed cause and in but small ratio. In Heintzleman's division the brigades of Sedgwick and Jamison were examined: In the former no case of enteric fever was found and but few of bilious remittent; in the latter there were a few cases presenting the appearance of typhoid fever in which were the taches rouges and intestinal symptoms, pathognomonic of the disease, accompanied with pulmonary and cerebral disturbances, but the cases were convalescing and no new ones were appearing.

From the data furnished by the investigations stated above the Board feel justified in concluding:

First. That the large majority of febrile diseases which have been reported as "typhoid fever" are not cases of that fever which is characterized by the eruption of rose-colored spots about the seventh day and has for its peculiar lesion inflammation and ulceration of the glands of Peyer and is known in the Northern States as typhoid or gastro-enteric fever, but they are bilious remittent fevers, which not having been controlled in their primary stage have assumed that adynamic type which is present in enteric fever, on which account they have been erroneously termed "typhoid," whereas in reality those lesions which invariably accompany true "typhoid fever" have been wanting. There is undoubtedly present in some patients low delirium, subsultus tendinum, sordes on the teeth and gums with occasionally a black, dry and glazed tongue, but the tender and tympanitic abdomen, the taches rouges and the diarrhœa, which are almost constant symptoms in enteric fever, are absent. Cases of typhoid fever certainly exist in the army, but it is so far from being epidemic that the ratio of its occurrence is less than it would be in civil life amongst the same number of individuals.

Secondly. The cause of the bilious remittent fever that exists in the Army of the Potomac is undoubtedly the malaria generated in the vicinity of the river to which it has been exposed during the late summer and autumn months, but the causes of the typhoid condition that it takes on are different and probably within our reach to be guarded against. The hygienic measures instituted by the Medical Director of the Army of the Potomac are proving effectual in lessening the number of cases of malarial fever, and it is possible that measures may be adopted which will lessen the tendency of diseases to take on the low forms that they have lately assumed. This tendency may originate from blood-poisoning induced by the crowding together of men in close and illy ventilated quarters, from fatigue occasioned by excessive drilling, from over-exertion resulting from a too protracted tour of duty, from nostalgia and from a want of attention to personal cleanliness. If it occur from these causes, and in the opinion of the Board it does, the prevention is in the hands of the proper authorities. Sufficient space should be given for quarters; a proper discretion exercised in the allotment of time for drill; consideration should be shown for those engaged in laborious and fatiguing duty; cleanliness should be rigidly enforced and nostalgia avoided by diversion of mind brought about by proper gymnastic and other sports, and it may be that the depressing influences now operating will be obviated and as a necessary result the adynamic type of disease will be changed.

The Board takes this occasion to remark that the sanitary condition of the army generally is eminently satisfactory as far as it has come under observation, the number of cases of disease being proportionally few and of these but a small ratio are of a serious character.

Papers appended to the Report of the Board.

Brigade Surgeon JAMES KING, *U. S. Vols.*—**1st.** The last three monthly reports of the surgeons show in the four regiments of the brigade 539 cases of remittent fever and 37 of typhoid fever, the mean strength of the brigade being about 3,200, officers and men. **2d.** The surgeons represent two forms of fever as prevailing—one, bilious

remittent, a fever of malarial origin, the other typhoid, "the typhoid of the North." In my opinion it is impossible to draw such a line of distinction respecting these fevers as to divide the cases into two well-defined classes, one exhibiting in its group of symptoms the ordinary diagnostic marks of typhoid and the other of remittent fever. On the contrary, there is a certain *tout ensemble* or general form belonging to all by which we recognize one affection, though varying in its features in different cases, just as we know the physiognomy of man in all its diversified modes of expression. I have observed the following characters or so-called diagnostic signs of the two diseases apparently expressed and variously coexisting in the same subject. It would be easy to arrange the facts observed in a tabular statement showing in one column the distinguishing marks of the "malarial" and in the other of the "typhoid" disease, but the facts are so commingled and united in many cases that if required to classify them with one or the other disease it would be difficult to say to which they belong. The following facts, for example, I have observed as variously coexisting in many cases:

Evidences of remittent fever or disease of "malarial origin."

1st. The disease made its appearance in autumn and on the Potomac (malarial region).

2d. Many of the subjects have the disease developed suddenly.

3d. Rare cases begin with epistaxis.

4th. No special tendency to diarrhœa manifested, at least I have not observed this.

5th. We very seldom see much tympanites, often none.

6th. The fever has distinct remissions and is found in company with true intermittents.

7th. In the first stages the tongue is furred white or yellow, enlarged and indented at the edges.

8th. Numerous cases of other malarial disease occurring, as neuralgia and jaundice, fever patients showing jaundiced urine.

9th. Certain marked effects of quinine in relieving headache, stupor and delirium in the early stages, in cutting some cases short and occasionally in affording speedy benefit when the cases are characterized by dry tongue, rose-spots and other signs of the typhoid condition.

10th. Certain *post-mortem* appearances, as loss of color in the liver and distention of the gall-bladder; the liver was very pale in two cases examined.

11th. Exposure to night-air before the attack in localities where intermittents arise, as on night marches, picket duty, etc.

Evidences of typhoid, the "typhoid fever of the North."

1st. It continues to prevail after the heavy frosts and in winter.

2d. Most cases have a protracted convalescence though they have not been attacked with particular violence.

3d. Many show rose-colored spots.

4th. Few cases, none that I have known, have shown much nausea and bilious vomiting.

5th. Many of the cases have suffusion of the eyes, dusky countenance and mental hebetude.

6th. The duration of the disease when fully marked mostly runs on to the third or fourth week.

7th. In the last stages the tongue is dry and glazed, often cracked and covered with sordes.

8th. The occurrence of troublesome suppurations, as abscess about the parotid glands, following the fever in a number of cases.

9th. Certain good effects of turpentine in cases with glazed tongue and tympanitic abdomen, the decided advantage of nutritious stimulants, as brandy-punch, in all cases, and the apparent necessity of supporting means to relieve the adynamic state and resist the tendency to death by asthenia.

10th. Certain *post-mortem* appearances, as thickening, inflammation and ulceration of Peyer's glands in three cases examined, and affection of mesenteric glands. Ulceration of the elliptical plates was noticed where there was no gaseous distention of the bowels.

11th. Previous crowding of men in badly ventilated tents in filthy camps, for as yet it has been impossible to enforce proper police regulations.

I cannot pursue this analysis further in the present report, but I will ask, are we justified in regarding all the facts above noted as entitled to weight, as I think we are, and in determining from the combination in the same cases of many of these characteristics of two diseases that we have a mixed affection? Or, if not, shall we take the "rose-colored eruption" and affection of Peyer's glands as pathognomonic of the disease and say it is typhoid fever, or take the influence of quinine in the treatment as specific for the malarial poison or some such characteristic and say the fever is a "bilious remittent?" In my judgment it is only by carefully collecting the facts noted by regimental and hospital surgeons who have made diligent observation of their cases that we can arrive at just conclusions on this subject, the investigation of which, by a competent officer detailed for the purpose, would not be without its uses to the public service. **3d.** As to treatment, I have observed most satisfactory results from the use of quinine, beginning with a dose of sixteen or twenty grains in the morning and the remedy continued in smaller doses for several successive mornings in the early stages of the disease, the occasional use of blue mass, febrifuge mixtures when indicated, the early resort to nutritious stimulants and fluid nourishment with nitrate of silver, sugar of lead and spirit of turpentine administered for certain enteric symptoms when particularly indicated. The inflammatory and congestive complications are treated successfully in the usual way by sinapisms and cupping. **4th** and **5th.** As to the symptoms and cause of the fever, I have no other report than that given above to indicate its character. **6th.** As to the localities of regiments, I have to refer to the reports of the regimental surgeons. **7th.** As to percentage of sick, I suppose that is sufficiently answered with the 1st point. **8th.** As to gangrene of the toes: This I observed in one case; in another great pain was complained of, but I observed no discoloration or sloughing of the skin. In both the fever was protracted, but as I had not the opportunity of watching the progress of the disease in the first case I have no further remarks on the subject.

Surgeon H. K. NEFF, *8th Pa.*—**1st.** This regiment has at the present time ten or twelve cases of bilious remittent and typhoid fever under treatment. **2d.** The so-called typhoid fever here is not the same in all particulars

as that of the North. I consider it emphatically of malarial origin. **3d.** Treatment has been in all cases antiperiodic, tonic and stimulant. Large doses of quinine are given at the outset and followed by decreased doses throughout the course of the attack. Blue mass is also frequently given in combination with the quinine when indicated. Ordinarily after the first dose, which is usually from fifteen to twenty grains, the patient gets the quinine in divided doses so as to receive from ten to twelve grains in 24 hours. In addition to this he gets tonics such as the tincture of iron and, when indicated, diuretics, febrifuges, etc. The usual plan of treatment is that pursued in the North in like cases except the quinine and stimulants during the early stages. **4th.** The symptoms are similar to those of ordinary fevers. The tongue, however, is flabby, watery and pale, remaining so, except in the most malignant cases, throughout the whole course of the disease; when the fever is of the malignant type the tongue is dark, dry and in some cases fissured. The pulse is generally feeble from the start. In many cases for several days after its onset the disease assumes a decided remittent and in some cases intermittent form; but in most instances it afterwards becomes continued. **5th.** The supposed cause is malaria. Exciting causes: Exposure, irregularities in diet, drink, etc., and an indifference to the established rules of hygiene generally. **6th.** Last locality: A northern slope near the Potomac on the Virginia side, Fairfax Co. Present locality: Southern slope of opposite hill facing former location. **7th.** Percentage of sick: 4½. **8th.** Gangrene of toes: no remarks.

Ass't Surg. D. McKINNEY, 10*th Pa.*—**1st.** The number of cases of bilious remittent fever treated in our hospital has been 38, of which 13 occurred at Camp Tennally and 25 at Pierpont; we had three cases of typhoid fever. **2d.** From my observation I am led to believe that the army typhoid is of malarious origin. Our first case had just recovered from an attack of bilious remittent fever and the two other cases showed decided remissions at first. Quite a number of our bilious remittent fevers exhibited for a time a typhoid character, although yielding readily to large doses of quinine. **3d.** In the treatment of typhoid fever quinine, solution of the acetate of lead, mucilage of turpentine, wine and brandy were used. **4th.** The early symptoms were those of remittent fever, but after a few days decided symptoms of typhoid fever were displayed. The disease yields much earlier to treatment than the typhoid fever of the North. **5th.** Malaria is the supposed cause, aided by the entire change of habits of the volunteer from the comforts of home to excitement, exposure, badly prepared food and crowded tents incident to camp life. **6th.** Camp Tennally, two cases; Camp Pierpont, one case. **7th.** Four per cent. for the past thirty days.

Surgeon S. G. LANE, 5*th Pa.*—**1st.** We have had from December 1 to date 24 cases of remittent and one of typhoid fever. **2d.** The typhoid reported is properly so called, and is the typhoid or enteric fever of the North. **3d.** Our treatment consists of quinine, gentle purgatives when needed, alteratives, turpentine, nourishment, stimulants and cleanliness; local complications are treated as their character demands. The large and repeated doses of quinine, so highly lauded by many authorities, have failed in our hands to effect the promised good results, and, I believe, when given thus heroically, it is apt to oppress the nervous powers, mask the symptoms and aggravate local congestions into inflammations. **4th.** The symptoms vary as the case may be remittent or enteric fever. In the remittent the disease usually makes its appearance suddenly with a chill, followed by fever and perspiration; sometimes the patient has a sallow, sickly appearance, with impaired appetite, nausea, diarrhœa and the tongue covered with yellowish or whitish fur. This diseased condition intensifies and breaks into a distinct remittent, or an intermittent may pass into a remittent. When the fever is fully formed the patient has slight remissions, quick pulse, hot skin, headache, tenderness of abdomen and more or less delirium; the tongue soon becomes dry and cracked, the bowels relaxed and the stools various. Many cases pass early into a low or typhoid condition with the usual symptoms. The local affections are numerous, occurring in the head, chest and abdomen. Usually the enteric cases begin insidiously: Nervous derangement is an early symptom; fever, sometimes at first remittent; epistaxis; pulse quick and feeble; headache, confusion of mind and dulness of hearing; stools characteristic; dry glazed tongue; sordes on teeth; appetite often not affected; hemorrhage from bowels; rose-colored eruption on abdomen; tympanites not always present; slow and tedious recovery; patients generally young men; deaths sudden; ulcerations of glands of intestines discovered on *post-mortem* examination; strong tendency to local inflammations. **5th.** The supposed causes of remittent fever are miasmata, but as our cases tend so rapidly to the typhoid condition I believe them also influenced by the causes which develop enteric fever. Our camp is located on a narrow tongue of land until within a short time densely wooded and surrounded by woods. A slow, boggy spring, in which four regiments wash, runs along one side, and at the point of the strip upon which we are encamped it meets another purer stream running along our other side. The tents are crowded together, preventing proper drainage. Six men sleep in one A tent. They have no straw, insufficient blankets, sleep in their clothes, which they can seldom change, disregard cleanliness, cook badly, take no gymnastic exercise and are discouraged. Log houses are being built by the men, but they are close and crowded. Here is a process of impairing the vital forces which must make our diseases adynamic. **6th.** These diseases have prevailed in this regiment since September (when I joined), but are now more severe. **7th.** Percentage of sick of aggregate force to-day 13.11. **8th.** Have had no gangrene of toes.

Surgeon L. W. READ, 1*st Pa.*—**1st.** Number of fever cases from August to December inclusive: Remittent 526, typhoid 7. **2d.** Many of the cases treated were well defined remittent fever, but the majority presented various grades of complication, manifested by a sense of great weakness, exhaustion or prostration indicating the presence of some depressing or epidemic influence; and as they did not present the characteristics of genuine typhoid they were regarded and treated as remittent fever. Only seven cases, two of which died, gave evidence of pure typhoid fever. **3d.** The great change in the habits of the men, such as exposure to rain and night-air in the performance of picket and guard duty, lying on the ground, sleeping in wet clothes, etc. **4th.** Many of the cases were ushered in without any premonition, but the majority were preceded for one or two days by a feeling of great fatigue or disinclination to exertion, with pain in the head and back; tongue coated and the circulation accelerated; about the

third day there was a decided chill and fever with an aggravation of all the symptoms. There was generally a combination of these conditions in the morning. A number of the cases yielded readily to treatment and were convalescent in five or six days. Those that persisted were characterized by a feeling of exhaustion or prostration, heavily coated or dry tongue, pain in the head and back, loss of appetite, occasionally nausea and diarrhœa with slight tympanites. The urine was turbid or highly colored, with a strong ammoniacal odor. **5th.** When the case was seen during the remission quinine was freely given, and during the day blue-pill followed by castor or croton oil was administered. When seen during the presence of fever, quinine was preceded by purgatives; as a febrifuge neutral mixture or muriate of ammonia was given; when the tongue was dry turpentine was used, and when there was much depression an emulsion of carbonate of ammonia, brandy-punch and beef-tea; restlessness was treated with anodynes. **6th.** The locality of the regiment before the breaking out of the disease was Camp Wayne, West Chester, Pa. **7th.** Percentage: Remittent fever 526, typhoid 7. **8th.** I have had no case of gangrene of the toes but have treated a number of cases in which there was great pain and acute sensibility of the toes, several of which have persisted for more than three months.

Brigade Surg. W. G. Lowman, *U. S. V.*—**1st.** I am of opinion that all the cases of fever in my brigade are bilious remittents. **2d.** The typhoid fever here is not the typhoid of the North. Although there are many of the symptoms, as slight diarrhœa and tympanites, rose-spots, delirium, etc., the disease comes on too rapidly for typhoid and there is not that hebetude of body and mind, tenderness or tympanites of the bowels, nor the red pointed tongue that we have in the North. The disease assumes a typhoid type in cases that run on for ten days or two weeks, and in constitutions that have been broken down by previous disease, in drunkards, etc. I am of opinion that if the use of quinine be commenced early the disease will be broken up in from three days to a week, at least in the majority of cases. Those of my surgeons who use quinine early and freely have few cases of the so-called typhoid,—it is almost always cut short. Hence I look upon the disease as remittent in character and caused by malaria. Indeed all diseases here are, I think, influenced more or less by malaria. If a man takes a bad cold, sufficient to produce a little fever, icterus shows itself and he will in all probability have remittent fever. **3d.** The treatment is blue-pill and quinine; and those who give these freely have the best success. When the disease runs on for ten days or two weeks and the tongue becomes red, dry and chapped, the treatment consists of stimulants and alteratives, as turpentine, brandy, wine-whey, punch, etc. The turpentine acts admirably on the dry, chapped tongue. **4th.** The symptoms generally come on rapidly with chilliness or rigors followed by heat, full pulse, dry tongue, slightly furred and soon becoming brown, constipated bowels, tenderness in epigastric region, frequent vomiting, jaundiced skin often preceding the attack, flushed eyes and face and congested surface; and in all these cases the patient is quite delirious. The remission is well marked in some cases, but in others it is not—in either event quinine generally acts well; but if the disease be not arrested in the course of a week, typhoid symptoms make their appearance. I suppose the cause of the disease to be malaria. **6th.** The location of the brigade at the breaking out of the disease was Camp Tennally. **8th.** I have not seen any gangrenous toes in my brigade. Permit me further to state that the prevailing disease at present is a catarrh of a peculiar character. There is seldom any coryza or lachrymation. It commences with a dry, tickling cough with little expectoration, no fever or loss of appetite except in a few cases which run into bronchitis. The patient feels well generally, but coughs almost incessantly. The disease began about a month ago after a few foggy nights followed by hard frosts. Since the frost our remittent fever (or so-called typhoid) has decreased very much. There has not been a new case in my brigade for about three weeks, which is additional evidence to my mind that it is caused by malaria and is not typhoid.

Surgeon W. H. Thorne, *12th Pa.*—**1st.** Of bilious fever we have had but one case in our regiment; of typhoid we have had four, in all of which there was more or less tendency to inflammation of the lungs. **2d.** This typhoid is the same as that of the North; it is not malarial and does not yield to antiperiodics. A spurious typhoid, which prevailed during the summer and fall, presented many of the symptoms of true typhoid, but there was a marked remission generally in the forenoon, and although the tongue indicated more or less intestinal irritation in some of the cases, the bowels were mostly constipated. This disease was of malarial origin and yielded readily to alteratives and antiperiodics—blue mass and quinine; none of the cases were fatal. **3d.** The treatment of typhoid has been alterative, supporting and stimulant; turpentine was given in nearly every case and with marked benefit. **4th.** Symptoms: More or less nervous derangement, headache, furred tongue and diarrhœa; in some cases epistaxis, tympanites, sordes on the teeth and delirium; the taches rouges were mostly present. **5th.** Cause: Impure and confined air, cold and damp, and irregularities in diet added to an improper location. **6th.** Locality: Near the bottom of a hill with a marsh on one side and low, damp ground on the other. **7th.** Now sick, 10 per cent. of the command, the majority being catarrhal affections. **8th.** We have had several cases of wounds of toes, but no gangrene.

Surgeon J. A. Phillips, *9th Pa. Reserves.*—**1st.** During the last three months I have treated 56 cases of remittent and 14 of typhoid fever. **2d.** The majority of the idiopathic fevers which have come under my observation were of the remittent type and differed from the enteric or typhoid fever of the North in these particulars: The disease was not often preceded by headache, dulness or feelings of malaise, but began abruptly, nor was it preceded by epistaxis or diarrhœa; the bowels were generally constipated during the course of the attack; in most cases rose-colored spots and sudamina were not developed; there were distinct remissions though not at any particular time in the day; lastly, the fever could often be checked in a few days by the free use of quinine. Patients were generally convalescent in ten or twelve days; but if the disease was not subdued within two weeks, it often ran into an adynamic form resembling typhoid in some respects. **3d.** A mercurial cathartic was first administered followed in a few hours by fifteen, twenty or thirty grains of quinia. Refrigerant diaphoretics were freely given during the fever. I was not deterred from the liberal exhibition of quinine by the absence of a distinct remission nor by symptoms of gastric

or cerebral disturbance. If the disease assumed a low form quinine, ammonia, milk-punch and the most nutritious diet, beef-tea and beef-essence, were given. It may be proper to add that I have often seen a dry, brown tongue become clean and moist in twenty-four hours after the administration of what would be called in the Northern States a heroic dose of quinine. **4th.** In a few instances the attack was preceded by languor, loss of appetite, etc., but in most cases it began with a chill and pain in the head, back and limbs, followed by smart febrile excitement. There was generally a remission of the fever daily, sometimes twice a day; the tongue covered with a pasty fur such as I have seen accompanying yellow fever; bowels constipated; skin dry and pungent except during the remissions; conjunctivæ of a yellow tinge; pain in epigastric and hypochondriac regions; urine highly colored. **5th.** The effects of miasmata. Three months ago the regiment for strategic reasons was encamped in its present position. The tents were pitched on low ground with hills rising on either side. The camp, from the nature of its site, cannot be properly drained and policed. **6th.** Tennallytown, D. C. **7th.** The monthly reports show an average of 2½ per cent. **8th.** I have not seen a case of gangrene of the toes; convalescents from remittent fever have complained occasionally of stiffness and soreness of the toes, but these symptoms yielded promptly to emollient applications.

Brigade Surg. A. E. Stocker, *U. S. V.*—**1st.** In answer to the first query, as the cases I have seen, although numerous, have been only in consultation with the regimental surgeons, I can give no additional information. **2d.** Such of the cases as I have examined and designated as typhoid fever were clearly cases of the true typhoid fever of the North, characterized by all the usual symptoms and phenomena of that disease as it there exists. There have, however, been a great number of cases which in their commencement and progress were true bilious remittent fevers, although they subsequently put on a low or typhoid type; these were undoubtedly due to malarious influences. **3d.** I have advised quinine and iron, the former in doses of two or three grains every two hours, with milk-punch and strong essence of beef; when the tongue became dry, brown and cracked, turpentine was used with excellent effect. **4th.** The cases I have designated as typhoid have had, in addition to the usual symptoms of febrile disease, the low compressible pulse, extinguishable by pressure, so characteristic of this fever, with epistaxis, deafness, flushed and besotted appearance, diarrhœa and taches rouges. If I should say one symptom of typhoid was less marked than those usually found in this disease it would be the want of special tenderness and gurgling in the right iliac fossa, while in many cases the tenderness on pressure seemed to be equally diffused over the abdominal cavity. **5th.** The cause of the disease is yet undetermined. I am not prepared to say that there is even a greater number of cases of this disease in the camps of this division than would exist were the same number of men placed under the care of one or two physicians in any city of the North. **6th.** As the manifestation of the disease does not seem to have been sudden at any time in my experience here, it would be impossible for me to designate the locality of the regiments when it broke out. **7th.** As no time has been specified for the calculation of the number of cases the regimental reports cannot be expected to approach uniformity in their calculation of the percentage of typhoid cases. **8th.** I have seen two cases of gangrene of the toes in the regiments under my charge. They were consequent upon attacks of typhoid fever; the issue of them I cannot tell as they were removed to general hospital before entire convalescence had taken place.

Surgeon D. Stanton, 1*st Pa. Cav.*—**1st.** We have now five cases of remittent fever, all mild and amenable to quinine in five-grain doses three times daily; of typhoid fever we have one case now convalescent and one case in division hospital. **2d.** With perhaps one or two exceptions the typhoid cases we have had this fall have been clearly of a malarious origin. **3d.** A mild purgative and quinine in five-grain doses every three hours during the remission; during the febrile paroxysm sweet spirit of nitre with acetate of ammonia. When about the eighth or tenth day the remissions become less marked and typhoid symptoms appear, the quinine is continued in doses of two or three grains every four hours, with brandy, beef-tea and wine-whey, and when the tongue becomes dry and parched and the bowels tympanitic I give castor oil and turpentine every four hours. I have found blisters upon the abdomen to be of great advantage in the second stage of the disease. **4th.** Nearly all of our cases have been of a remittent character at first. About the sixth or eighth day the fever became of a more continued form, with more or less delirium and subsultus, tympanites, hot skin, compressible pulse, tongue at first furred and afterwards smooth or cracked and dry, and on the ninth or tenth day the characteristic eruption of rose-spots would appear on the body. About the end of the second week, in favorable cases, the tongue becomes moist and clean at the tip and edges; in more protracted cases it cleans off from the centre, becoming dry, parched and cracked. Diarrhœa occurred in most of the cases, but was not attended with hemorrhage. The mortality of the cases treated in the regimental hospital has been about twenty per cent. **5th** and **6th** may be conjoined, for the locality of our camp was certainly the cause of two-thirds of our typhoid cases. We were located at first on damp, low ground, not susceptible of drainage. Two weeks after this our sick-list was doubled, and ten or twelve of our typhoid cases originated. The camping ground was certainly pregnant with causes of malarial and typhoid fevers. In addition to this cause there were also those resulting from the mode of life in camp, and especially in the camps of recruits who have not yet learned and practiced the most salutary police regulations. Bad cooking and want of cleanliness in their persons, clothes and quarters, the change and irregularity of diet, exposure, etc., may be named amongst the causes of typhoid fever and diseases in general. **7th.** Sick 84, mean strength 909, giving about 9.25 per cent., including about 25 who have been recommended for discharge, and also those injured by horses, gunshot wounds, etc. **8th.** But one case of gangrene of the toes has occurred,—in a severe and tedious case of typhoid fever. The predisposing cause was, I think, the low vital powers of the system and the exciting cause the pressure of bed-clothes. As this was the only case we were not sufficiently on the alert; perhaps had more care been taken the gangrene might have been prevented. Bathing in warm water or with hot whiskey and the application of artificial heat might prevent this trouble in a measure, if not altogether.

Surgeon J. COLLINS, *3d Pa.*—**1st.** Cases of bilious remittent 52, of typhoid fever 16, taken sick during the month of November. **2d.** There has been a striking similarity between the febrile cases observed in camp and those I have seen in Pennsylvania and New England. A few cases have begun as well-marked remittents and ended as typhoid fever of a malignant type. Moreover, the fact that quinine is well borne in all typhoid cases would seem to indicate that malarial influences operated in them. **3d.** The treatment has not been uniform. As a rule in a case of remittent fever a mercurial purge is given, followed by oil or a saline and afterwards by quinine and tincture of iron. Should the case prove persistent, alterative doses of blue-pill are given. During the paroxysm great relief is afforded by neutral mixture or acetate of ammonia. Hoffmann's anodyne is valuable, and in the later stages good milk-punch plays an important part. The sequelæ of the disease, debility, diarrhœa and jaundice, need particular attention. Typhoid cases require strict watching as the symptoms are in many cases insidious and deceptive. After the first stage these bear stimulants and quinia quite well; in fact stimulants are absolutely necessary. Carbonate of ammonia, milk-punch with generous diet of beef-tea and animal broths, and in certain cases turpentine emulsion, are given with great advantage. In the obstinate and debilitating diarrhœa of typhoid I have found catechu most efficient. **4th.** In remittent fever, besides the ordinary febrile symptoms, may be noted a peculiar brown or bluish-black coating of the tongue. This peculiar shade I have never noticed before. In other cases the conjunctivæ are injected, often yellow and the tongue of a reddish tint. The paroxysm generally occurs towards evening. In typhoid cases there is generally a greater tenderness or gurgling in the line of the colon; the discharges are dark or watery; the pulse has a hollow vanishing beat; the tongue is dry; the fever continued; rose-colored spots, etc. **5th.** The supposed cause is concealed in the two terms used with scientific flippancy, viz: predisposition and malaria. **6th.** The regiment has never been quite free from the disease. I think the violent and malignant form assumed in November due to location in the swamp just in advance of our present encampment. **7th.** During the month 32 per cent. of the whole regiment were sick at one period or another. **8th.** One case of gangrene of the toes was sent to division hospital. Another, a patient suffering from a violent attack of typhoid fever, occurred in the regimental hospital: On the morning of the tenth day he complained of intense pain in the toes. The feet were cold, the toes quite blue or bluish-black. I immediately ordered stimulation, and heat to be applied externally, with large doses of tincture of iron, milk-punch and good diet. In a few days the patient ceased to complain and the symptoms yielded.

Surgeon J. S. DE BENNEVILLE, *11th Pa.*—**1st.** From August to December inclusive we have had 20 cases of remittent fever and 19 of typhoid. **2d.** The cases of typhoid were similar to those called typhoid or enteric fever at the North. **3d.** Treatment was by gentle purgatives when necessary and diaphoretics of neutral mixture or acetate of ammonia combined with sweet spirit of nitre, tartrate of antimony or ipecacuanha in the first stage. Mecurials combined with diaphoretics were used as the secretions diminished and the tongue became furred and dry; cold applications to the head, dry cups to the temples and back of the neck and blisters to the temples or scalp when fever and delirium were present. In the advanced stages, when the tongue became dry and fissured and the abdomen tympanitic, turpentine was employed with advantage. Dry cupping, mustard poultices and stimulating liniments to the chest were used in treating bronchitis and pulmonary complications. The diet was at first arrow-root gruel, farina and barley, but as the disease advanced beef-tea, essence of beef, milk-punch and wine-whey were given with cinchona or quinine. **4th.** The patient usually suffered from a feeling of general uneasiness and discomfort, headache, alternate sensations of heat and chilliness, diarrhœa, in some cases epistaxis, furred tongue, etc. These symptoms became aggravated with dry skin and tongue, pain in the iliac region, tympanites, bronchitis or pneumonia. Rose-colored spots and sudamina were found in nearly all cases; marked cerebral disorder with delirium occurred in many. **5th.** It is probably the endemic fever of this region, its increase being favored by overcrowding in small tents and neglect of cleanliness. **6th.** The first case occurred while the troops were at Camp Tennally, about a month after they had removed from a camp one mile north of Washington. **7th.** The number of sick daily averaged 5.0 per cent. in July and August, 4.5 in September, 5.0 in October, 5.75 in November and 6.75 in December. **8th.** The only case of gangrene that came under my notice was at the division hospital. The patient had been sick in this regiment for seventeen days with a low form of remittent fever in which the prominent symptoms were cerebral; the lower limbs became œdematous and the gangrenous condition appeared soon after his entrance into hospital.

Surgeon S. D. FREEMAN, *13th Pa. Reserves.*—**1st.** During the last three months we have had 91 cases of bilious remittent and 9 cases of typhoid fever. **2d.** The typhoid fever is not the typhoid of the North, but originates in bilious remittent, attributed to malaria. **3d.** Treatment is alterative, tonic and stimulating by blue mass, carbonate of ammonia, turpentine, quinine and brandy. The disease does not yield to quinine. **4th.** Headache, with chills, backache, general malaise, tongue coated, at first yellow then dark, crusting and cracking in the centre—in short, the usual symptoms. **5th.** The cause is supposed to be the change from a high and dry to a low and moist climate, as that portion of the regiment coming from the Alleghany mountains suffers most. **6th.** The regiment was encamped at Harrisburg, Pa.; Cumberland, Md.; New Creek, Va.; then again at Harrisburg, Sandy Hook, Buckeyestown and Hyattstown, where fevers first made their appearance. **7th.** The percentage of sick from all causes is at present 7.25. **8th.** There is no gangrene of the toes.

Surgeon A. W. GREEN, *7th Pa. Reserves.*—**1st.** Six cases for the present month. **2d.** I do not consider it the same as the typhoid fever of the North; it commences as a bilious remittent, running rapidly into a typhoid condition, and almost invariably with strongly marked cerebral symptoms. I think the heavy fogs overhanging us almost every night, the nature of the soil, vegetable mould with clay subsoil, and the constant digging connected with camp improvements serve to indicate a malarial origin. **3d.** Quinine in doses of three to ten grains every two hours generally succeeds in breaking up the fever; but at this time we have to be exceedingly careful, else the disease

will assume the typhoid form. The treatment in this event consists of turpentine emulsion, opium or Dover's powder, beef-tea, milk-punch, brandy, carbonate of ammonia, etc. **4th.** Chilliness, restlessness, fever, headache, pain in back and bones, general uneasiness, torpor of the bowels, pain in bowels, tenderness on pressure, tympanites, diarrhœa, hemorrhage, dilated pupils, entire adynamic condition, death. **5th.** The supposed causes are miasm and exposure. **6th.** Camp Tennally. **7th.** Three and one-half per cent. **8th.** Convalescents complain very much of their feet, but I have not met with a case of gangrene.

Brigade Surg. S. R. HAVEN, *U. S. V.*—The report of sick and wounded shows in October 1,794 cases of disease and in November 2,918 cases. Most of those included in the report for October have been of a distinctly malarial type: Remittent, intermittent and continued fevers; also a large number of cases of measles.

Camp Advance is situated on the bluffs forming the southwest bank of the Potomac at Chain bridge. These bluffs vary from 180 to 200 feet in height. The Potomac at this point and for a considerable distance above and below flows over a rocky bed with steep banks on both shores, extending back in rolling hills with sharp gulches intervening. The region is, therefore, apparently non-malarious. The intermittent and remittent fevers that have prevailed here during the last month are attributable, I think, to the extensive felling of timber and clearing up of a new country required by the military necessities of the camp. This division was moved to its present camp October 10. Its topography is not unlike that of Camp Advance except that it is four miles distant from the Potomac. It will be observed that the diseases reported indicate a gradual deepening into more serious forms as the season advances. These forms, I think, are not correctly designated typhoid, the condition being rather that of a low form of bilious remittent incident to the depressing influence of camp life upon those wholly unaccustomed to it.

Brigade Surg. J. H. WARREN, *U. S. V.*—As far as I have visited the various camps in this division I have not been able to find more than six or eight cases of true typhoid fever as I have been accustomed to see it at the North. These cases were, I think, brought with the troops from the North here. We have a great many cases of bilious remittent fever assuming the typhoid type. Quinine, opium and camphor seem to be the best agents for the treatment of this form of fever. The surgeons unite in this statement, that all cases begin with the usual form of remittent fever and end with the typhoid type. The common diagnostic signs of typhoid fever as we see it farther North are wanting in the incipient stage of the disease.

In the face of this testimony acknowledging the existence of typhoid fever in our camps, but pronouncing the prevailing camp-fever to be essentially a malarial fever of an adynamic character, it is difficult to conceive that the insertion of the term typho-malarial in the monthly sick reports, without a word of explanation as to its scope, could have so influenced medical officers in the field as to cause them to change their views and regard these fevers as typhoid modified by active malarial phenomena. As a matter of fact their opinions remained unchanged. This is fully evidenced by the sanitary reports that were filed subsequent to June 30, 1862, the date of the introduction of the new term. Thus, Surgeon JONATHAN LETTERMAN, U. S. A., Medical Director of the Army of the Potomac, in a report covering the first six months after the date stated, referred the prevailing typhoid type of fevers to the action of the deadly malarial poison.* His successor, Surgeon THOMAS A. MCPARLIN, U. S. A., makes use of the new term, but does not explain the value attached to it when he says† that "during the advance from the Rapidan to Petersburg malarial and typho-malarial fevers and diarrhœa were the prevailing diseases," and he is equally indefinite, so far as the use of the new term is concerned, when later in the same report he mentions "fevers of the intermittent and typhoid type" among the diseases prevalent during the siege of Petersburg.

The large number of cases, 23,346, reported as typho-malarial during the year following the introduction of this term, shows how generally it was accepted by medical officers in the field; but it has no bearing on their views as to the essential nature of the fevers thus reported.‡ The term, when used outside of the monthly reports of sick and wounded, was seldom accompanied by any data indicating whether a modified typhoid or an adynamic remittent was intended. There is on the files of the Surgeon General's Office but one report which attaches to typho-malarial the value which Dr. WOODWARD had in view on its official introduction. It reads as follows:

* P. 93, Appendix to the First Part of this volume. † *Loc. cit.*, p. 161.

‡ "As it was, the term went upon the sick report without any explanation or a word of comment. But even under these circumstances 23,346 cases were reported as typho-malarial fever during the following year, showing how widely the opinions I had formed were shared by the medical officers of the Army."—Dr. WOODWARD's paper on *Typho-malarial Fever, Section of Medicine, International Medical Congress*, Philadelphia, 1876, p. 12.

Surgeon WM. O'MEAGHER, *37th N. Y., Edward's Ferry, Md., Sept.* 30, 1862.—But notwithstanding all our efforts, aided by abundance of nourishment and stimulants, several died of a mixed disease which is, to my mind, accurately named in the new monthly reports of sick and wounded as typho-malarial fever. The two cases of this nature recorded in my report for August exhibited very marked evidence of typhoid fever and miasmatic poisoning, and the treatment was adapted accordingly. In one case the delirium was so violent as to approach the character of mania; cerebro-spinal meningitis was the prominent condition, and to this the treatment was mainly directed, the remote and exciting cause being, however, kept in view. But the patient died exhausted in a few days. The second case partook more of the typhoid condition and the delirium was of the usual character. He also died in an equally short space. A third man recovered, but I am satisfied his constitution is permanently impaired. He is still in the regiment and under observation, being on light duty only. I should have mentioned that the daily exacerbations in each case varied considerably. In the first there was violent delirium, almost maniacal; in the second a mere shudder with low muttering; and in the third a convulsive tremor, with gurgling in the throat and a hissing expiration accompanied by the expulsion of some frothy mucus between the teeth.

On the other hand Ass't Surg. J. T. CALHOUN, U. S. A., believed the fevers of the Peninsula to be not enteric but miasmatic, and appropriately denominated typho-malarial.* "The form of fever termed by the negroes swamp fever, but which should be known, perhaps, in scientific nosology as typho-malarial fever, was very frequent."† Dr. CALHOUN bore testimony also to the absence of intestinal glandular lesions in certain adynamic fevers.‡

Surgeon J. M. RICE, *25th Mass., New Berne, N. C., March* 10, 1863.—The intermittents, unless controlled by the administration of cinchona or other antiperiodics, passed into remittent, and the remittents frequently assumed that type of disease now named in our reports typho-malarial. In the commencement there was usually cephalalgia; pain in the eyes; severe aching pain in the back and limbs, very noticeable even in the milder cases; sometimes nausea and vomiting: generally slight desire for food. The condition of the bowels was variable—diarrhœa when present being readily controlled. During the remissions the debility was quite marked, with indisposition to the slightest exertion. In a number of cases I had the most satisfactory evidence that the production of cinchonism cut short the disease in its early stages, and, as it appeared to me, without causing any unsatisfactory result when this was not accomplished. In some cases there was a tendency to the congestive form, and this, when occurring in those debilitated by frequent attacks of intermittent or by recent remittents, was always dangerous and in some instances fatal. Nearly all were remarkable for the long and unsatisfactory period of convalescence. Treatment consisted of mercurials combined with other cathartics; sometimes emetics; counter-irritation when required; the exhibition of quinine in full doses in the early remissions; diaphoretics during the febrile paroxysms, accompanied with a dry skin, and later in the disease quinine in small doses, with stimulants when needed.

But perhaps the strongest evidence of the undetermined value attached to the term typho-malarial by our medical officers is afforded by a report of Surgeon GEORGE A. OTIS, afterwards for many years the colleague of Dr. WOODWARD in the preparation of this history:

Remarks on the Monthly Report of Surgeon GEORGE A. OTIS, *27th Mass., New Berne, N. C., June*, 1863.—There were three cases of typho-malarial fever (so-called)—cases in which it was impracticable for me to decide whether the disease should be pronounced remittent or typhoid fever. One (Hall) entered on the 21st instant with high fever, delirium, excessive prostration. He had been reported at surgeon's call for ten or twelve days previously with diarrhœa, but his bowels were confined when he was admitted. There was abdominal tenderness, especially near the cæcum. There was no remission in his fever, and the administration of quinine was not ventured upon, for signs of rapid sinking were speedily noticed. He died three days after admission. It was not practicable to make an autopsy. The other fatal case was similar in many respects, save that the cerebral complications were less prominent. Although a remission was anxiously looked for, none could be detected. At last tentative doses of quinine were given. They did not apparently aggravate the symptoms, but they failed to relieve any of them appreciably. In the third case, the only one of recovery, quinine was administered before an absolute remission was observed. The next day there was a fair remission, and the antiperiodic was given immediately in full doses with the happiest effect.

This able officer made use of the term one year after its introduction, not as embodying his views of the pathology of the febrile cases, but as indicating his inability to discriminate between a typhoid modified by malarial manifestations and a remittent with typhoid symptoms.

The general acceptance of the term typho-malarial fever, as indicated by the large number of cases reported under it, shows manifestly that it filled a nosonomial want which had been sorely felt. It may be fairly claimed that it was made use of in all febrile cases not purely

* In his report, p. 91, Appendix, Part 1st. † *Op. cit.*, p. 92.

‡ In the *Med. and Surg. Reporter*, Vol. X, Phila., 1863, p. 97, he says that besides cases of pure enteric fever which differed in no manner from those seen in civil life, there frequently occurred cases of an adynamic fever in which there were no enteric symptoms, no rose-colored spots and no epistaxis; and in these *post-mortem* examination failed to reveal any ulceration or change of structure in the glands of Peyer.

enteric, which presented the so-called typhoid symptoms, by those who regarded such symptoms as indicative of enteric fever, by those who regarded them as developed during the persistence of a malarial fever irrespective of the presence of typhoid, and lastly, by those who, in the absence of *post mortem* investigation in individual cases, were ready, like Dr. Otis, to confess their inability to determine whether a specific typhoid element was or was not present.

From the frequency with which ulceration of Peyer's patches was found in the *post-mortem* researches conducted at the general hospitals, the officers forming the staff of these institutions very generally concluded that the prevailing fevers of the Army were essentially typhoid. The cases which occasionally presented an unaltered intestinal mucous membrane, or one changed only by an apparently unspecific congestion, were accepted as showing that death had resulted from the malarial influences to which our troops were almost constantly exposed. But these cases, as has already been explained, seldom lived to reach the general hospitals, or if they did so died subsequently, not from the primary fever, but from secondary pneumonic or intestinal complications, the latter of which offered to view extensive ulcerations of the intestines simulating the appearances of typhoid fever. Typho-malarial fever, therefore, to the medical officers of these hospitals generally, implied an enteric lesion. Positive results were obtained at the necropsies, and specimens were forwarded to the Army Medical Museum in such numbers as seemed to the pathological anatomist to leave no doubt of the character of the prevailing fever.

But fatality and prevalence are not synonymous. Fevers presenting ulceration of the small intestine, and particularly of its closed glands, certainly occasioned more deaths than those unassociated with such anatomical changes, but the universal testimony of the medical men who treated the fever cases that recovered or died at an early period after the onset of the disease, is to the effect that the prevailing fevers were essentially paroxysmal. The hospital pathologists did not give due weight to these assertions. They found that the field surgeons reported large numbers of typho-malarial cases, and assuming that these cases were characterized by pathological conditions similar to those with which their experience had made them familiar, they conceived their view of the enteric nature of the fevers reported as typho-malarial to be correct because based upon *post-mortem* research instead of on symptomatology and therapeusis.

But, as has been indicated by certain of the *post-mortem* records of typho-malarial cases, this term was applied by the field surgeons to fevers which in its absence would have been returned as malarial remittents. Inasmuch as no instructions had been issued limiting the applicability of the term to enteric fever with malarial complications, these officers were fully justified in including under it those malarial cases which had typhoid, *i. e.*, adynamic tendencies, particularly as there was nothing in the first part of the compound term to limit its significance to one specific cause of typhoidal symptoms. Undoubtedly, also, the new term was accepted by many as enabling them to dispose of their anomalous cases without committing themselves to certain etiological and pathological doctrines.

The pathologists were therefore in error in supposing that enteric fever was present in all the cases reported as typho-malarial by our medical officers. This view is sustained by a study of the monthly changes in the curve of prevalence; and on it only can the singular death-rate of typho-malarial fever be understood. It has been shown by the records of the Seminary hospital that the fatality of typhoid cases which were complicated with

active manifestations of the malarial influence was much greater than that of uncomplicated cases; and such a result is consistent with our general experience of the action of morbific agencies on the system, especially when these agencies have similar destructive tendencies. But the statistics of the white troops show that although the mortality caused by typhoid subsequent to the introduction of the new term was 40 per cent. of the cases, the mortality of the cases reported as typho-malarial was only 8 per cent. This is convincing proof that the medical officers who placed these cases on the monthly reports did not restrict the term to cases in which there was a coincidence of both fevers. Had they done so an antagonism between the action of the typhoid and malarial poisons on the human system would have been immediately established. But there was no evidence of an antagonism of this character. On the contrary, typhoid fever was deadly in proportion to its modification by other deteriorating agencies, chief among which was the malarial influence.*

In true typho-malarial fever at least 41.4 per cent. of cases among the white troops should have terminated fatally, since typhoid gave 40 per cent. of fatality and remittents 1.4 per cent. from June 30, 1862, to the end of the period covered by the statistics. But as the cases reported under the term typho-malarial were fatal at the rate of only 8 per cent., it may be inferred that for one case thus reported which was really characterized by the specific typhoid element, there were 4.85 cases which could not have been typhoid as they lacked its gravity and were so amenable to specific treatment that they furnished only the mortality which would have occurred among an equal number of malarial remittents. In other words, 83 per cent. of the cases reported among the white troops as typho-malarial were remittents or febrile attacks attended with no greater mortality than the remittents. Speaking approximatively, of the 49,871 cases thus reported more than 41,393 were remittent and less than 8,478 were true typho-malarial cases.

A similar calculation on corresponding data furnished by the statistics of the colored troops—to wit: Percentage of typhoid cases which ended fatally 55.69, of remittents 3.27, of cases reported as typho-malarial 17.27—shows that 73 per cent. of the cases entered on the reports under the new term were remittents or febrile attacks which had no larger mortality than the malarial remittents.

Typhoid fever, including typhus, occasioned during the war 181 cases of sickness and 59.6 deaths among every thousand of our white soldiers. The remittent-malarial fevers caused 694 cases and 8.2 deaths. There were also 115 cases and 8.6 deaths attributed to typho-malarial fever. But the cases last mentioned have been seen to consist of one truly typho-malarial case to 4.85 malarial remittents. Were the typho-malarial figures duly distributed among the typhoid and the remittent fevers the former would number 200 per thousand of strength, with 67.16 deaths, and the latter 759 per thousand with 9.24 deaths. There were thus more than seven deaths attributable to typhoid fever for every death caused by adynamic remittent or other low fevers not specifically typhoid or enteric. In other words, seven cases of fever with typhoid symptoms presented typhoid ulcerations for one case of fever with typhoid symptoms which had no ulceration of the closed glands. Hence the opinion of the pathologists that a specific typhoid was the prevalent fever. The relative prevalence of these fevers was, however, 3.7 of malarial remittent to one of true typhoid; most of the former were treated in camps, of the latter in general hospitals. Hence

* "I find I agree in this respect with a writer who, while denying any antagonism between the poison of typhoid and that of malarial fever, considers that the latter does not modify the gravity of the typhoid affection; but, on the contrary, it, or the remedies employed to control it, seemed rather to render the former more severe and less fatal."—*American Journal Med. Sci.*, 1864, Vol. XLVII, p. 407.

the opinion of the field surgeons that the prevailing fever was a malarial remittent. These figures include the vast number of typhoid fever cases that occurred after the organization of the volunteer armies. Had they been excluded by making use of the statistics of the third year of the war, that ending June 30, 1864, the remittents would have been found to have outnumbered the enteric cases in the proportion of 6.5 : 1, although the chances of finding typhoid ulcerations in a fatal case of low fever would yet have remained as high as 5.4 : 1.

It is to be regretted that the applicability of the new term was not fully explained and limited on its introduction. Had this been done, the attention of our medical officers would have been directed to the differentiation of typhoid fever with malarial complications and remittents with adynamic symptoms, and our knowledge of this clinically obscure subject would have been materially improved. As it was, the new term was productive of undesirable results. It dissociated cases of typhoid and malarial fevers from their etiological, pathological and therapeutic associates, thus injuring the totality of the statistics of both the classes, and massed them in uncertain proportions in a separate group which could be analysed only at the close of the war on the presentation of all the materials relating to it. Instead of conducing to discrimination and simplification in the study of the camp fevers its use tended to admixture and confusion. It appears, also, to have been responsible for the lack of material illustrative of itself, as by affording a local habitation and a name to obscure cases it relieved medical officers from the official necessity of maturely considering them prior to formulating a diagnosis or of entering into the details of their peculiarities and difficulties. Moreover, the term was carried by our medical men into civil practice at the close of the war, where it has perpetuated the uncertainties attaching to the cases that have been classed under it.*

But while the cases reported under the heading typho-malarial comprised so small a proportion of such as were really typho-malarial in the views of the originator of the term, it by no means follows that true typho-malarial fever was a rare occurrence in our camps. On the contrary, it may be said with certainty that it occurred with greater frequency than unmodified typhoid; and owing to its tedious and uncertain course, the typhoid affection being often prolonged by preliminary malarial attacks, and the return to health interrupted by relapses of the malarial essential or prevented by the development of diarrhœal, dysenteric, pneumonic or other sequelæ common to both its elements, it assumed prominence among the fevers of our camps as being the most destructive to the army as well as to the life of the individual, although by no means the most prevalent fever.

In the early months of the war typhoid fever was to be expected from the aggregation of young and susceptible subjects under unhygienic conditions. But as the men at this time had not become so thoroughly affected by the malarial poison as was the case at a later date, their typhoid epidemics ought to have been of a comparatively unmodified character. Nevertheless it has been shown by the clinical records of the Seminary hospital that many of the cases which then occurred were distinctly impressed by the malarial poison and on that account entitled to be ranked as typho-malarial fevers. Later in the war the frequency of such cases undoubtedly increased, but as the typhoid element was recognized by some symptom regarded as pathognomonic or by *post mortem* observation in a sample case of the series, the fever was reported as typhoid and not as typho-malarial. It is impossible to

* See page 509, *infra*.

Dr. WOODWARD was correct in assigning importance to the true typho-malarial fevers, but he erred in regarding the numbers reported under the typhoid heading as giving expression to that importance. The true typho-malarial cases were usually reported under the term typhoid. The military reports indicate that when typhoid became epidemic among men on duty in a malarious section the disease did not present the characteristics common to it in the civil population of the Northern States. Only in regiments newly levied and as yet unexposed to malarial influences was the typhoid disease similar to that with which their medical officers had been familiar in civil life. In the first-mentioned commands the disease was accompanied by grave features; while in those last referred to the mortality from typhoid was generally slight. In some instances a hundred cases had been reported with only a few deaths. Correspondingly the rate of fatality of typhoid was only 13.3 per cent. among the white troops during the first eight months of the war, while it rose later, as the disease became modified, to an average of 38.3 per cent. The greater fatality during the later years may not be wholly attributed to the malarial influence, but that it was due in part to this is obvious from the evidence already presented. These considerations imply a relative paucity of cases of unmodified typhoid fever and a large proportion of cases which, had the term typho-malarial been properly applied, would have been dropped from the reports as typhoid and recorded as typho-malarial.

It has been shown that the cases reported as typho-malarial were chiefly composed of malarial continuous with a comparatively small percentage of true typho-malarial cases. It has been shown also that of the cases reported as typhoid the majority were really complicated with malarial phenomena, and were thus in fact typho-malarial cases, while the minority were cases of unmodified typhoid. But among those reported as typhoid was another group in which typhoid symptoms were associated with no anatomical lesions other than those attributable to the action of the malarial poison. In other words, adynamic remittents and malarial fevers assuming a sub-continued form and typhoidal tendency, while forming the majority of cases reported as typhoid, constituted also a portion of those fevers reported as typho-malarial. The following series of cases will amply sustain the latter part of this statement. In [illegible] these there is no clinical history to show what were the symptoms during life, but each [illegible] is presumes the existence of more or less of the so-called typhoid symptoms, while in a minority of the cases some of these typhoid symptoms are specified. A certain number of these cases, so far as can be learned from the *post-mortem* records, were instances of true typhoid; others were instances of true typho-malarial fever; but a third and comparatively inconsiderable number, were cases which offered to view no other lesion than those which had been construed as indicating the presence of malarial disease. These cases, like those which preceded them, have been arranged for convenience of study in accordance with the character and situation of the changes in the intestinal canal:

CASES REPORTED AS TYPHOID FEVER, THE CLINICAL HISTORY INSUFFICIENT OR ABSENT—182 CASES.

[illegible]

Case 117.—[illegible] Private [illegible], Co. I, 45th Pa., was admitted April 7, 1864, with a [illegible] temperature, [illegible] symptoms of typhoid fever. He died on the [illegible]. Examination [illegible] ulcers [illegible] slight adhesion [illegible] of [illegible] portion [illegible] of ileum.—A. [illegible], Post Surg., Cavalry Corps Hospital, Petersburg, Va.

CASE 118.—Private Henry H. Whitney, Co. D, 53d Mass., was admitted Aug. 16, 1863, having been sick a week with diarrhœa, great prostration, dry and furred tongue, sordes on teeth, sudamina on abdomen and chest, suffusion of face and tympanites of abdomen. Gave beef-tea and sherry wine. 19th: Severe chill. 20th: Mumps; pulse 110, quick and feeble. 21st: Great prostration; rusty sputa; crepitant râles; death. *Post-mortem* examination ten hours after death: Both lungs congested posteriorly and partly adherent to thoracic walls, with slight effusion into each pleural cavity; heart healthy; stomach much distended; bowels purple-spotted on their serous surface; Peyer's patches in several instances prominent, much congested and slightly ulcerated.—*Union Hospital, Memphis, Tenn.*

CASE 119.—Private John H. Beckwith, Co. C, 79th N. Y.; age 33; admitted June 6, 1865. Diagnosis—typhoid fever. Died 26th. The only symptoms mentioned are delirium, almost constant, and much jactitation. *Post-mortem* examination twelve hours after death: Lungs adherent to pleuræ by fibrinous bands; spleen enlarged and softened; Peyer's patches ulcerated.—*Slough Hospital, Alexandria, Va.*

CASE 120.—Private Robert Booth, Co. A, 147th Pa.; age 21; was admitted Nov. 4, 1863, delirious, with dry tongue and sordes, and on the second day after admission involuntary discharges from the bowels. He died on the 13th. *Post-mortem* examination showed "that condition of the intestinal glands usually found in typhoid cases."—*Act. Ass't Surg. James Robertson, 1st Division Hospital, Alexandria, Va.*

CASE 121.—Private Albert Graff, Co. D, 4th N. Y., was admitted Nov. 30, 1864, with typhoid fever, much exhausted by his journey from City Point, Va. His tongue was dry and brown, teeth covered with sordes, bowels tender; he was affected with low delirium and subsultus. He died December 3, having had involuntary fæcal passages and retention of urine for twenty-four hours before death. *Post-mortem* examination: Extensive ulceration of Peyer's patches.—*Third Division Hospital, Alexandria, Va.*

CASE 122.—Private Aaron T. Ward, Co. B, 20th Me.; age 25; was admitted Oct. 29, 1862, with diarrhœa following typhoid fever. He was feeble and emaciated; the stools were generally natural in color, but liquid and occasionally streaked with blood. On November 11, the diarrhœa still continuing, he was attacked with diphtheria characterized by suffocative paroxysms; he died next day. *Post-mortem* examination eighteen hours after death: The larynx was œdematous and lined with pseudo-membrane. The lungs were congested. The heart was normal, its right ventricle filled with a large firm clot. The stomach, liver and kidneys were normal. The glands of Brünner were enlarged; Peyer's glands thickened and in the lower portion of the ileum ulcerated.—*Third Division Hospital, Alexandria, Va.*

CASE 123.—Private William Martin, Co. M, 17th Pa.; age 23; was admitted July 19, 1863, delirious and with a hot and dry skin, frequent and feeble pulse, dry and brown tongue, tender bowels and some diarrhœa. He died on the 21st. *Post-mortem* examination twenty-four hours after death: Mucous membrane of the small intestine inflamed; glands of Peyer ulcerated; mesenteric glands enlarged; lower lobes of both lungs congested; heart and liver normal. —*Act. Ass't Surg. S. Upson, Third Division Hospital, Alexandria, Va.*

CASE 124.—Corp'l Charles S. Benedict, Co. B, 144th N. Y , was admitted April 14, 1863, moribund: Pulse 130, very feeble; respiration 28; tongue dry, brown, cracked; bowels relaxed; skin moist; extremities cold, clammy. He died next day. *Post-mortem* examination twenty-four hours after death: Mucous membrane of larger bronchi abnormally red; liver and spleen enlarged and softened; stomach injected; mucous membrane of small intestine much injected; Peyer's patches enlarged, some deeply ulcerated.—*Third Division Hospital, Alexandria, Va.*

CASE 125.—Private Anthony Duchey, Co. C, 195th Ohio; age 18; was admitted April 6, 1865, much emaciated and very weak, his mind much impaired. A number of small abscesses on his thighs and legs, on being punctured, discharged a quantity of thin milky pus. He had a large deep bedsore over the sacrum and one over each trochanter, great thirst, anorexia and a red, dry, transversely fissured tongue. He died on the 24th. *Post-mortem* examination four hours after death: Large deposits of pus were found beneath the skin and between the muscles of the lower extremities; the right parotid gland was infiltrated with pus. The liver adhered to the diaphragm and the abdominal parietes; its substance was softened; the gall-bladder was enormously distended with black bile; the spleen was enlarged and softened. The stomach was contracted and its mucous membrane inflamed; the ileum inflamed and Peyer's patches ulcerated.—*Act. Ass't Surg. S. B. West, Cumberland Hospital, Md.*

CASE 126.—Private John S. Hall, 17th Ind. Bat'y; age 18; was admitted Nov. 10. 1862, with typhoid fever, and died on the 20th. *Post-mortem* examination: The only lesion found was an extensive inflammation and ulceration of Peyer's patches.—*Ass't Surg. H. Pierce, 150th N. Y., Stewart's Mansion Hospital, Baltimore, Md.*

CASE 127.—Private William O'Brien, Co. D, 38th Mass.; age 19; was admitted Nov. 5, 1862, with typhoid fever, and died on the 9th. *Post-mortem* examination: Heart, lungs, stomach, liver and kidneys normal; inflammation of Peyer's glands: intussusception in the middle third of the ileum.—*Act. Ass't Surg. T. F. Murdoch, Stewart's Mansion Hospital, Baltimore, Md.*

CASE 128.—Private Patrick Farmer, Co. B, 38th Mass., was admitted Oct. 7, 1864, from City Point, Va., with typhoid fever, and died next day. *Post-mortem* examination sixteen hours after death: Ulceration of Peyer's glands; much pleuritic effusion.—*Act. Ass't Surg. John T. Myers, Beverly Hospital, N. J.*

CASE 129.—Private William J. Roberts, 26th Ohio Bat'y; age 22; was admitted Nov. 29, 1864, with typhoid fever. He died December 10. *Post-mortem* examination twenty hours after death: The spleen weighed thirty-four ounces; Peyer's glands were inflamed and ulcerated throughout the ileum and for some distance up in the jejunum. —*Natchez Hospital, Miss.*

CASE 130.—Private John Prall, Co. K, 160th Ohio; age 22; was admitted Aug. 29, 1864, greatly prostrated and almost unconscious. He died next day. *Post-mortem* examination: Extensive ulceration of Peyer's patches and an intussusception of one portion of the ileum.—*Seminary Hospital, Columbus, Ohio.*

CASE 131.—Private Jonathan Heaman, Co. H, 57th Pa.; admitted April 30, 1864. Died May 10. *Post-mortem* examination twenty hours after death: Body much emaciated. Lungs and spleen congested; Peyer's glands ulcerated.—*Act. Ass't Surg. C. W. Fillmore, Harewood Hospital, Washington, D. C.*

CASE 132.—Private Joseph J. Reed, Co. B, 8th Ill. Cav.; admitted April 16, 1864. Typhoid fever. Died May 6. *Post-mortem* examination five hours after death: Body slightly emaciated. The lower lobe of the left lung and the lower border of the right lung were much congested and sank in water. The heart was normal. The liver was slightly enlarged; the gall-bladder full; the spleen much congested, weighing forty-one ounces; Peyer's patches were enlarged and many of them ulcerated; the mesenteric glands were much enlarged.—*Act. Ass't Surg. J. D. Linton, Harewood Hospital, Washington, D. C.*

CASE 133.—Private Jno. Bender, Co. G, 67th Pa., was admitted May 10, 1865, with typhoid fever, and died next day. *Post-mortem* examination twenty-eight hours after death: Lungs normal; heart pale; liver pale; spleen much enlarged; Peyer's patches ulcerated; kidneys normal.—*Depot Field Hospital, Sixth Army Corps, Army of Potomac.*

CASE 134.—Private James McLoon, Co. E, 40th N. J., was admitted May 10, 1865, with typhoid fever, and died on the 13th. *Post-mortem* examination seventy-two hours after death: Lungs, heart, liver, spleen and stomach normal; mesenteric glands enlarged; Peyer's patches ulcerated.—*Depot Field Hospital, Sixth Army Corps, Army of Potomac.*

CASE 135.—Private William D. Ebaugh, Co. F, 39th Ind.; age 18; was admitted Dec. 14, 1863, with typhoid fever, and died March 2, 1864. *Post-mortem* examination twenty-four hours after death: Much emaciation; pleuritic adhesions on both sides; right lung hepatized red and gray, left lung partly hepatized; heart weighed ten ounces; liver sixty-four ounces, fatty; spleen fifteen ounces and a half; right kidney six ounces, left six ounces and a half; mucous membrane of stomach somewhat congested; lower ileum showing a few large cicatrizing ulcers in Peyer's patches; large intestine normal.—*Hospital No. 1, Nashville, Tenn.*

CASE 136.—Private Jacob Spangles, Co. M, 1st Mich. Eng'rs, was admitted Dec. 3, 1863, with typhoid fever, and died on the 11th. *Post-mortem* examination fourteen hours after death: Pericardium containing six to eight ounces of serum; heart filled with large cadaveric clots; lungs hepatized posteriorly, the right containing a few hard isolated tubercles; liver and kidneys normal; spleen weighing fourteen ounces; mesenteric glands enlarged; Peyer's patches deeply ulcerated; stomach and large intestine normal; anterior abdominal wall much contused inferiorly and presenting some blood-clots beneath the peritoneum.—*Hospital No. 1, Nashville, Tenn.*

CASE 137.—Private W. H. Slingland, Co. H, 14th U. S. Inf., was admitted June 15, 1863, and died on the 17th. *Post-mortem* examination twenty-one hours after death: Body not emaciated. Brain healthy. Æsophageal mucous membrane yellow-tinged and presenting superficial ulcers in its lower portion, the ulcers having their greatest diameter parallel to the axis of the tube. Lymphatic glands at bifurcation of trachea much softened and blackish; upper and middle lobes of right lung and upper lobe of left lung slightly congested, lower lobes intensely congested. Heart flabby, containing no clots; pericardium everywhere firmly attached to the heart, obliterating the sac. Liver very flabby, dull greenish in color, evolving a peculiar chicken-coop odor and so soft that the finger could be inserted in every direction; gall-bladder containing eight drachms of dark ochre-colored bile; spleen dark, soft, pultaceous, weight seven ounces. Lower fifth of small intestine ulcerated, the ulcers confined to Peyer's patches and presenting ragged surfaces, purplish walls and congestion of the surrounding mucous membrane—the patches higher up in the intestine being pale and not elevated or congested. Kidneys congested.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

CASE 138.—Private Stephen Cornwright, 18th N. Y.; age 23; was admitted Nov. 30, 1864, with fever and feet gangrenous from frost-bite. He died December 20. *Post-mortem* examination two hours after death: Body much emaciated. The larynx, trachea, œsophagus and heart were normal. The right lung weighed twenty-two ounces and the left thirty ounces; the lower and middle lobes of the right lung and the lower lobe and lower portion of the upper lobe of the left lung were solidified and studded with small abscesses. The liver weighed seventy-one ounces and a half and the spleen seven ounces and a half; Peyer's patches were ulcerated; the kidneys appeared to be normal. [The attending physician remarks: "This man was admitted with both feet in a gangrenous condition. According to his own statement he had them frozen; but my opinion is that their condition was a result of his fever." This opinion is supported by the register of the hospital at Giesboro Point, Md., in which the patient appears as admitted November 25 with typhoid fever, and as sent to General hospital on the 29th. No reference is made to frost-bite.]—*Lincoln Hospital, Washington, D. C.*

CASE 139.—Private Nathan Upton, Co. B, 1st D. C. Cav.; age 32; was admitted Sept. 6, 1863, with typhoid fever, and died on the 19th. *Post-mortem* examination eight hours after death: Rigor mortis well marked. The brain substance was healthy; the pia mater slightly congested; half a drachm of fluid was found in the ventricles. The right lung weighed twenty-four ounces, the left fifteen ounces; the lower lobes of both were much congested. The right auricle of the heart contained a venous clot which extended into the ventricle; the left auricle contained a small fibrinous clot; the pericardium was everywhere firmly attached to the heart, so that its separation was almost impossible without tearing the muscular tissue. The liver was healthy; the gall-bladder contained three ounces of a thin straw-colored liquid; the spleen was firm and dark purple on section, weight thirteen ounces and a half. The mucous membrane of the stomach was congested. The small intestine was healthy in its upper portion, but in its lower part the solitary glands were enlarged and Peyer's patches ulcerated. The large intestine was healthy. The kidneys were congested; weight of right six ounces and a half, of left seven ounces.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 140.—Private Charles B. Beams, Co. B, 146th N. Y.; age 26; admitted Nov. 23, 1863; died 27th. *Post-mortem* examination twelve hours after death: Rigor mortis extremely marked; body moderately emaciated. The brain was unusually firm and weighed forty-nine ounces; its ventricles contained one drachm and a half of fluid. The larynx, trachea and œsophagus were natural. The right lung weighed eleven ounces and a half and the left twelve ounces; the lower lobes were engorged, softened, friable and charged with frothy bronchial secretion. The heart was healthy and contained a large fibrinous clot in its right cavities; the pericardial liquid was pale and measured fourteen drachms. The liver was healthy, weight sixty-eight ounces; the spleen firm, natural in size and of normal color. The small intestine was much distended with air; within five feet of the ileo-cæcal valve its mucous membrane was deeply congested, the solitary and agminated glands prominent, and the latter ulcerated in parts of their surface. The kidneys were congested.—*Ass't Surg. H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 141.—Private Thomas Butler, Co. H, 137th N. Y., was admitted Jan. 11, 1863, with typhoid fever, and died during the night. He came from Fairfax Court House, Va., to Washington in an ambulance without covering, so that he was thoroughly chilled. Stimulants were employed without effect. *Post-mortem* examination: The thoracic viscera, the liver, spleen and kidneys were normal. The small intestine was inflamed; Peyer's patches were thickened and ulcerated; the solitary glands were much swollen, especially in the jejunum, where they stood out from the mucous membrane, attaining the size of medium-sized shot and having their apices pigmented or, in some cases, ulcerated.—*Lincoln Hospital, Washington, D. C.*

Case 142.—Private Milton Striker, Co. C, 188th N. Y., was admitted Feb. 1, 1865, and died on the 3d. *Post-mortem* examination: Upper lobe of right lung hepatized, middle lobe healthy, lower lobe congested, weight of lung fifty-four ounces; upper lobe of left lung healthy, lower lobe congested, weight fourteen ounces. Heart normal. Weight of liver seventy ounces; of spleen fourteen ounces. Stomach healthy; Peyer's patches and solitary follicles ulcerated; mesenteric glands enlarged. Kidneys healthy.—*Fifth Army Corps Field Hospital, Army of Potomac.*

Case 143.—Private James Loveland, Co. G, 4th Vt., was admitted Nov. 23, 1863, moribund. *Post-mortem* examination: Toes and anterior portion of metatarsus of both feet gangrenous. [*Specimens* 79 and 80, Med. Sect., Army Medical Museum, constitute the only record: 79, a portion of the upper part of the ileum, shows a single oblong and thickened Peyer's patch; 80, a portion of the lower part, presents two thickened and ulcerated patches and two small ulcers, corresponding probably to solitary follicles.]—*Ass't Surg. W. Thomson, U. S. A., Douglas Hospital, Washington, D. C.*

Case 144.—Private Michael Kennedy, Co. I, 32d N. Y.; age 24; was admitted Aug. 10, 1862, and died on the 11th. *Post-mortem* examination next day: The body presented a vigorous appearance, with but slight emaciation. Thoracic organs healthy. Liver cirrhosed, much enlarged, of a yellowish-brown color and granular, the granules about the size of pepper-corns; spleen enlarged, nine by five and a half by two and a half inches, but natural in color and consistence. Mucous membrane of ileum reddened, the lower agminated glands thickened and ulcerated, the upper unaffected. Other organs apparently healthy. [*Specimens* 60, 61 and 62, Med. Sect., Army Medical Museum, ulcerated patches and enlarged spleen, are from this case.]—*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 145.—Private Joseph Terry, 1st N. J. Cav.; age 19; was admitted Jan. 14, 1864, in a state of low delirium from typhoid fever. He died on the 19th. *Post-mortem* examination: Lungs congested; liver softened; Peyer's patches ulcerated.—*Third Division Hospital, Alexandria, Va.*

Case 146.—Private N. G. Carey, 1st N. J. Cav.; age 18; admitted Jan. 14, 1864. Diagnosis—continued fever. Died 18th. *Post-mortem* examination: Lower lobe of left lung hepatized; Peyer's patches ulcerated; one inch and a half of ileum gangrenous.—*Third Division Hospital, Alexandria, Va.*

Case 147.—H. Russell, citizen; colored. Died June 24, 1865. *Post-mortem* examination: The lungs and heart were normal. The spleen was large and hard; the mesenteric glands enlarged. A series of elevated Peyer's patches of all sizes, honey-combed and with constricted bases, extended from the ileo-cæcal valve along the ileum; the solitary glands for eight or ten inches from the valve were elevated and had softened white centres. [*Specimen* 565, Med. Sect., Army Medical Museum, taken from this case, shows also hypertrophied villi, giving the ileum a velvety appearance, seen in plate facing this page.]—*Act. Ass't Surg. W. C. Minor, L'Ouverture Hospital, Alexandria, Va.*

Case 148.—Private William T. Barrett, Co. K, 39th Mass., was admitted Dec. 24, 1862, with typhoid fever. Bronchitis set in about a week before his death, which occurred Jan. 29, 1863. *Post-mortem* examination twelve hours after death: The brain was pale, firm and weighed forty-three ounces. There were pleuritic adhesions on both sides. The lungs were marked by black pigment in the course of the ribs. The left lung weighed nineteen ounces and a half; its lower lobe was much congested and friable and its bronchial tubes congested, especially in their finer ramifications. The right lung weighed twenty-five ounces and three-quarters; there was a mass of solidified tissue in the posterior part of its lower lobe, the centre of which was occupied by fluid and opened into an inflamed bronchial tube of the third magnitude; several condensed pulmonary lobules were found also in the upper part of the lung; the bronchial glands were mottled black and white and were quite firm. The heart was flabby and contained clots. The liver, seventy-four ounces, was firm and of a light brown color, its acini comparatively distinct; the spleen, eleven ounces and a half, was soft and presented inferiorly a cyst containing half a drachm of fluid; the left kidney, five ounces, was slightly flabby and full of blood; the right kidney, four ounces and a half, was normal. The mucous membrane of the stomach was softened and free from folds. There were patches of intense congestion in the small intestine; some of Peyer's patches were ulcerated in the centre, some were neither ulcerated nor thickened and others near the valve contained black pigment and were ulcerated through to the peritoneum. The large intestine was quite thin.—*Lincoln Hospital, Washington, D. C.*

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THICKENED PEYER'S PATCH AND ENLARGED SOLITARY FOLLICLES.

No. 565 MEDICAL SECTION.

Case 149.—Private George Kiahl, Co. F, 39th N. J.; age 36; was admitted June 28, 1865, delirious and much exhausted. He had been sick ten days. The tympanites, which was present on admission, diminished, but was succeeded by profuse involuntary stools, with extreme exhaustion. He died July 9. *Post-mortem* examination twelve hours after death: The solitary follicles of the lower ileum were enlarged, congested and in some cases ulcerated; Peyer's patches were enlarged, pigmented and ulcerated. The remaining viscera were normal.—*Act. Ass't Surg. George P. Hanawalt, Douglas Hospital, Washington, D. C.*

Case 150.—Private David Cline, Co. H, 191st Ohio; age 24; was admitted June 21, 1865, in a state of collapse, having been sick about ten days with diarrhœa. His mind was obtuse; his pulse slow and almost imperceptible; tongue dry and white; skin bathed in cold clammy sweat. Stimulants were freely administered and he rallied somewhat, but nausea and hiccough supervened, and he died on the 23d. *Post-mortem* examination: Heart pale and flabby; blood uncoagulated and very thin; peritoneum over ileum covered with a deposit of coagulable lymph; mucous membrane of ileum inflamed; glands of Peyer ulcerated; corresponding mesenteric glands highly inflamed.—*Act. Ass't Surg. H. J. Wiesel, Cumberland Hospital, Md.*

Case 151.—Private Andrew M. Hyland, Co. D, 38th Mass.; age 21; was admitted Nov. 6, 1862, with typhoid fever, and died on the 10th. *Post-mortem* examination: Purulent effusion within the sheath of the rectus abdominis; exudation of lymph on the peritoneum, gluing the intestines together; ulceration of Peyer's patches; distention of gall-bladder by about four ounces of bile.—*Ass't Surg. H. Pierce, 150th N. Y., Stewart's Mansion Hospital, Baltimore, Md.*

Case 152.—Private William N. Peake, Co. C, 19th Wis.; age 18; was admitted from the Army of the Potomac Sept. 9, 1864, having been sick two weeks with typhoid fever. On the 13th a pain, which had developed on the preceding day in the left iliac region, became diffused over the abdomen and was accompanied with much tympanites. He died next day. *Post-mortem* examination two hours after death: The intestines were adherent; more than two quarts of a yellowish-colored liquid, which had escaped in part from the intestinal tube, were found in the peritoneal cavity. The glands of Peyer near the ileo-cæcal valve were indurated at the edges and soft in the centre; in one of these patches the ulceration had perforated the peritoneum. [*Specimen* 810, Med. Sect., Army Medical Museum.]—*Act. Ass't Surg. J. H. Butler, West's Building Hospital, Baltimore, Md.*

Case 153.—Private S. Emmons, 26th Ohio Bat'y; age 19; admitted Nov. 9, 1864, with typhoid fever. Died Dec. 11. *Post-mortem* examination: Body much emaciated. Peyer's patches extensively ulcerated, in many places as far as the peritoneum, which in some places was perforated.—*Act. Ass't Surg. J. T. Warner, Natchez Hospital, Miss.*

Case 154.—Private J. C. Morrow, Co. E, 110th Ohio; admitted Nov. 23, 1863. Died 28th. *Post-mortem* examination thirty-nine hours after death: The brain was healthy. The lungs were somewhat engorged posteriorly. The heart was flabby and contained a small clot in both sides, larger in the right than in the left. The liver was firm and somewhat congested, its surface of an intense bluish-slate color, which coloration extended two lines into the parenchyma; the gall-bladder contained an ounce of dark-brown bile; the spleen was of a purple color with an admixture of brown and was extremely firm; the pancreas was white and not very firm. The ileum, in its six lower feet, was extensively ulcerated; about two feet above the ileo-cæcal valve was a Peyer's patch of an irregular circular shape, presenting three distinct ulcers with high blackish walls and stone-gray bases, in one of which was a small perforation which had caused some exudation of lymph on the peritoneal coat. The kidneys were healthy.—*Ass't Surg. H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 155.—Sergeant James Geddis, Co. L, 6th Mich. Cav.; age 33; admitted Aug. 18, 1863. Died 22d. *Post-mortem* examination nineteen hours after death: The brain was firm and healthy. The trachea was of a dark-purple color, tinged with ochre on the rings; the bronchial tubes contained a dark grumous secretion. The œsophagus was yellowish throughout. The lungs were somewhat œdematous, the right weighing twenty ounces and the left twenty-one ounces. The heart was pushed upwards by the intestines; the right ventricle contained a fibrinous clot which extended some distance into the pulmonary artery; the left cavities contained a soft venous clot; the aorta was highly colored. The liver and stomach were concealed by the intestines; the liver was firm; the gall-bladder contained twelve drachms of dark-colored bile with a yellow flocculent deposit; the spleen was compact and of a dark-purple color; the pancreas was dark-green externally, hard and white internally. The intestines were much distended, evidently from cadaveric changes; the lower third of the small intestine was ulcerated in several places, in one of which there was a circular perforation with pale white edges, and the peritoneum surrounding it blackened to the extent of the Peyer's patch affected and covered with tough yellowish lymph for some distance beyond; the large intestine was healthy except that its solitary glands were conspicuous. The kidneys were dark-purple in color.—*Ass't Surg. H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 156.—Private W. S. Doyle, Co. H, 3d Mich. Cav.; admitted June 14, 1863; died October 15. *Post-mortem* examination: Sudamina were observed, especially on the abdomen and arms. The brain-substance was very firm; the lining membrane of the ventricles was roughened, especially over the corpora striata and the descending crura of the fornix, where the roughness seemed like an exudation of lymph, but it could not be detached without destroying the cerebral substance; there was no meningitis. The trachea, dark purplish-red in color, presented numerous minute whitish points of exudation on the surface of the mucous membrane at its upper part. The œsophagus was of a pale purple color superiorly and of a brownish hue below; an abscess the size of a chestnut was found in its walls. Both lungs were congested; the right weighing sixteen ounces and one-quarter, the left twelve ounces and a half. The heart contained fibrinous clots in both sides. The liver was firm, its capsule easily torn, its acini distinct; the spleen was pultaceous. The stomach was mottled and filled with liquid greenish fæcal-like matter. The intestines were distended with air; patches of the peritoneal surface were of a bright crimson color and the coils

of the small intestine were glued together with recent lymph; the duodenum was of a dark color, its villi softened and readily detached; the ileum was passively congested, its solitary glands enlarged, its agminated glands elevated and whitish, those near the ileo-cæcal valve forming elliptical ulcerated patches with high thickened walls and smooth pale bases, in many instances covered by a whitish adherent exudation, while in one instance the peritoneum formed the base and in another perforation had taken place; the large intestine was healthy. The kidneys were normal.—*Ass't Surg. H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 157.—Corporal Cyrus B. Clark, Co. B, 15th Vt.; admitted Dec. 14, 1862, with continued fever; died 21st. *Post-mortem* examination: Peyer's glands were ulcerated and one of the ulcers had perforated. There was general peritonitis and a large quantity of serum in the abdominal cavity. The recti muscles, in their lower third, contained much extravasated blood.—*Third Division Hospital, Alexandria, Va.*

Case 158.—Private John Clark, Co. E, 16th Va.; age 21; was admitted Nov. 13, 1862, presenting a hot skin, frequent feeble pulse, dry, dark and furred tongue, diarrhœa, tympanitic and tender bowels and slight dulness on percussion over the lower lobes of the lungs; there were no rose-spots nor sudamina. The patient apparently did well during the day and slept comfortably the greater part of the night, but towards morning he became delirious, after which he sank rapidly, and died during the day. *Post-mortem* examination: The middle and lower lobes of the right lung were engorged; the left lung was slightly congested. The heart was normal. The peritoneal cavity contained a large quantity of serum mingled with fæcal matter; the great omentum was engorged and the mesenteric glands enlarged. The small intestine was greatly discolored, in some places nearly black; its mucous membrane was reddened and engorged with black blood; the patches of Peyer were inflamed and ten of them ulcerated, two of the ulcers having perforated. The liver and spleen were enlarged but of normal consistence; the kidneys were normal.—*Third Division Hospital, Alexandria, Va.*

Case 159.—Private Martin Hogle, Co. B, 5th N. Y. Cav.; age 27; was admitted Aug. 12, 1864, with well-marked symptoms of typhoid fever. He was delirious, the abdomen tympanitic and tender, the tongue furred and the pulse accelerated. He died on the 29th. There was no diarrhœa until within four days of death. *Post-mortem* examination on the day of death: Rigor mortis well marked; body moderately emaciated. The trachea was lined with frothy sputa of a molasses color; the right lung normal externally, was studded internally with melanic spots about the size of peas, it weighed twelve ounces; the left lung was healthy, it weighed seven ounces and a half. The right side of the heart contained a large firm black clot. A considerable quantity of pus was observed on the omentum; the spleen, fourteen ounces and a half, was firm and of a bluish-slate color; the liver, seventy-eight ounces, appeared to be normal; the kidneys were healthy. Peyer's patches were extensively ulcerated and the ulcers had perforated in five places; the large intestine was normal. [See Med. Sect., Army Medical Museum, 369 to 373, and also plate facing this page.]—*Act. Ass't Surg. H. M. Dean, Lincoln Hospital, Washington, D. C.*

(B.) Peyer's patches ulcerated and the large intestine also implicated—45 cases.

Case 160.—Private James Kilgore, Co. D, 150th Ind.; age 30; was admitted April 25, 1865. It was at first supposed that this man was crazy, and his bed-card was marked accordingly: His manner was strange, his face flushed, his breath exceedingly offensive and his habits filthy; when asked his age he answered "about a hundred." On May 1 his pulse and respiration became frequent and he presented the physical signs of pneumonia. He died on the 3d. *Post-mortem* examination four hours after death: Suggillation on the chest and posteriorly; sudamina on the skin. There was some injection of the meninges and a moderate quantity of serum at the base of the brain. The right lung was engorged with blood and adherent to the thoracic parietes. The transverse colon was much constricted, not measuring more than eight lines in diameter; the mucous membrane of the ileum was inflamed and the patches of Peyer ulcerated. The spleen was very soft and enlarged to three times its ordinary size.—*Act. Ass't Surg. H. J. Wiesel, Cumberland Hospital, Md.*

Case 161.—Private Norman Boyd, Co. B, 1st Conn. Heavy Art., was admitted July 25, 1864, in moribund condition: tongue dark brown, dry and cracked; sordes on teeth; involuntary passages from bowels. He died comatose next day. *Post-mortem* examination five hours after death: Body not much emaciated. The lungs were engorged and the pleuræ adherent. Peyer's glands were slightly ulcerated for the space of eight inches above the ileo-cæcal valve, and extending for six inches below it were twenty or thirty ulcers, several of which nearly perforated the intestine; the rest of the intestine was apparently healthy.—*Fairfax Seminary Hospital, Va.*

Case 162.—Private Patrick Lynch, Co. A, 65th Ill.; age 17; was admitted July 20, 1865, with diarrhœa and constant delirium; he died on the 27th. *Post-mortem* examination: There was about an ounce of clear serum in each lateral ventricle and two ounces in the sub-arachnoid space. The posterior portions of both lungs were congested. Peyer's patches were greatly enlarged and ulcerated and the solitary glands enlarged. In the colon minute oval purpuria like spots were observed.—*Ass't Surg. Geo. M. McGill, U. S. A., Hicks Hospital, Baltimore, Md.*

Case 163.—Private O. J. Richardson, Co. C, 108th N. Y., was admitted Nov. 23, 1863, in a comatose condition: pulse 120, just perceptible; tongue dry and fissured; breast and abdomen covered with sudamina and feet and legs cold. Stimulants were freely given and warmth applied to the feet. He died on the 27th. *Post-mortem* examination thirteen hours after death: Much emaciation; feet becoming gangrenous. Lungs, heart and spleen normal; Peyer's glands enlarged and ulcerated; solitary glands of large intestine enlarged and ulcerated; mesenteric glands enlarged. —*Act. Ass't Surg. W. H. Letterman, Douglas Hospital, Washington, D. C.*

Case 164.—Private John Hutton, Co. D, 1st Vt. Cav., was admitted Nov. 23, 1863, delirious. He rolled from side to side in bed and picked at the bedclothes; his tongue and skin were dry, his pulse small and his feet cold;

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involuntary stools were passed frequently. Stimulants were given and warmth and mustard applied to his feet and legs. He died on the 27th. *Post-mortem* examination twelve hours after death: Body not emaciated; both feet gangrenous. Heart and lungs healthy. Spleen enlarged and of a dark-purple color; kidneys healthy; mesenteric glands enlarged; Peyer's glands enlarged and ulcerated; solitary glands of large intestine ulcerated.—*Act. Ass't Surg. W. H. Letterman, Douglas Hospital, Washington, D. C.*

CASE 165.—Sergeant Frank Donohue, Co. A, 17th Pa. Cav., was admitted Feb. 19, 1863, having been sick for two months with typhoid fever. He was completely deaf. On March 1 he had sore throat, severe headache and constipation. On the 15th his stomach became irritable and there was soreness in the bowels with diarrhœa. Later the stools became dark-looking but less frequent. He died on the 25th. *Post-mortem* examination forty-eight hours after death: Body well developed and not emaciated. The right lung weighed sixteen ounces and a half and the left twenty-one ounces and a quarter; posteriorly the lower lobe of the right lung was full of blackish-brown fluid, which also filled the bronchi; similar appearances were found in spots in the left lung. The heart weighed nine ounces and contained no clots; the aorta was somewhat contracted, deeply congested, and three inches beyond the semilunar valves was a cicatrix-like puckering with intense surrounding congestion. The liver was pale and weighed fifty-eight ounces and a half; the spleen soft, reddened, weighed twelve ounces and a half; the pancreas natural, three ounces and three-quarters; the stomach healthy. The mucous membrane of the upper part of the small intestine was yellowish and presented several roundish ulcers with well-defined edges in Peyer's patches and one patch, a half inch in diameter, enlarged and indurated; lower down the ulcers were more ragged and apparently did not involve Peyer's patches; in the last fifteen inches of the ileum the mucous membrane was of a reddish-slate color, the solitary glands brownish, and there were ragged excoriating ulcers in many of which was a thick yellowish exudation. The mucous membrane of the large intestine was of a dull slate color, presenting one ulcer on the ileo-cæcal valve, one at the commencement of the cæcum and a third four inches beyond. The kidneys were flabby and much congested.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

CASE 166.—Private John F. Chapman, Co. I, 32d Me.; age 35; was admitted July 2, 1864, with some irritability of the bowels, soreness of abdomen, slight tympanites, fever, great thirst, a dry furred tongue and a pulse of 110. He became afflicted with a troublesome cough on the 5th, which continued for some days, but on the 11th he was reported as improving. Two days later the stomach became irritable and the skin showed a tendency to slough. On the 14th he refused food and medicine, and next day he died. *Post-mortem* examination three hours after death: The right lung weighed fourteen ounces, the left fourteen ounces and a half; both were healthy except that there were a few softened tubercles in the upper lobe of each. The heart weighed eight ounces; its right ventricle contained a small fibrinous clot. The stomach was healthy. Peyer's patches were extensively ulcerated; the solitary glands showed many ulcers; the ileo-cæcal valve was much congested; the ascending colon presented two ulcers—the upper one, about the size of a pea, was superficial, the lower, five-eighths of an inch in diameter, penetrated to the peritoneum. The liver weighed sixty-nine ounces and was slightly congested; the gall-bladder contained five or six ounces of thin bile; the spleen weighed thirteen ounces.—*Act. Ass't Surg. James T. Logan, Lincoln Hospital, Washington, D. C.*

CASE 167.—Private Everett H. Felton, Co. G, 187th Pa.; age 28; was admitted Aug. 30, 1864, with an apparently mild attack of typhoid fever; but on September 20 a profuse diarrhœa supervened, and he died October 5. *Post-mortem* examination ten hours after death: Body much emaciated. Brain and thoracic viscera normal; a fibrinous clot in each side of the heart; spleen and kidneys normal; several Peyer's patches and solitary follicles ulcerated; numerous small ulcers in the large intestine.—*Act. Ass't Surg. H. M. Dean, Lincoln Hospital, Washington, D. C.*

CASE 168.—Private Lewis Weir, Co. A, 202d Pa.; age 18; admitted Nov. 2, 1864. Typhoid fever. Died on the 7th. *Post-mortem* examination forty hours after death: Rigor mortis well marked; suggillation posteriorly; no emaciation. On the upper surface of the cerebral hemispheres, anteriorly along the course of the large bloodvessels, there was in several places a gelatinous subarachnoid deposit; the subarachnoid space contained one ounce and a half of serum. The right pleural cavity contained two ounces and the left four ounces of dark bloody serum; the posterior part of the right lung was engorged and small portions of its upper and middle lobes were hepatized; the left lung was congested posteriorly. The intestines were distended with air; Peyer's patches in the lower part of the ileum were ulcerated in several places; the solitary follicles of the cæcum and of the first six inches of the colon were ulcerated; the remainder of the large intestine was normal; the mesenteric glands adjacent to the ulcerated intestinal glands were enlarged and dark-colored. The spleen was enlarged and softened.—*Act. Ass't Surg. Thomas Bowen, Second Division Hospital, Alexandria, Va.*

CASE 169.—Private Joseph Gilly, Co. D, 6th Pa. Heavy Art.; age 47; was admitted Oct. 30, 1864, with typhoid fever, and died November 3. *Post-mortem* examination nine hours after death: Marked rigor mortis; slight emaciation; suggillation posteriorly. Lungs very dark, filled with blood; bronchi slightly congested; bronchial glands normal; ventricles of heart dilated and containing small dark clots; liver enlarged, pale; spleen enlarged, darkened, much softened; mucous coat of stomach and jejunum normal; Peyer's patches in the lower two feet of ileum and solitary follicles of first six inches of colon thickened and ulcerated; mesenteric glands enlarged, filled with dark matter, especially three near the cæcum; kidneys congested.—*Second Division Hospital, Alexandria, Va.*

CASE 170.—Private John Verberson, Co. B, 35th Mass.; age 33; was admitted Nov. 30, 1864, convalescing from typhoid fever. He was much debilitated and had a severe diarrhœa. He died December 16. *Post-mortem* examination ten hours after death: Sudamina on legs and breast; slight suggillation posteriorly. Some pleuritic adhesions on the right side; emphysema of both lungs; puckering of middle lobe of right lung; three ounces of pale serum in pericardium; enlargement of liver; congestion and in some places ulceration of Peyer's patches; congestion of cæcum.—*Third Division Hospital, Alexandria, Va.*

Case 171.—Private George Wood, Co. B, 1st Bat'y, 2d Me. Light Art.; age 24; was admitted July 25, 1864, in very low condition. He died comatose on the following day. *Post-mortem* examination twenty-two hours after death: Body extremely emaciated. Stomach and intestinal canal greatly inflamed; large intestine much ulcerated; liver fatty; gall-bladder enormously distended; other organs healthy. [*Specimen* 420, Med. Sect., Army Medical Museum, which is from this case, shows several large ulcers of Peyer's patches just above the ileo-cæcal valve, penetrating in some places to the transverse muscle and in others to the peritoneum, as also some enlarged and ulcerated solitary follicles.]—*Surg. E. Bentley, U. S. V., Third Division Hospital, Alexandria, Va.*

Case 172.—Private Joseph Swartz, Co. M, 2d U. S. Cav.; age 22; was admitted June 12, 1863, for a contusion of the chest. On July 5 he was placed on duty as nurse, but on the 26th he became attacked with typhoid fever which proved fatal on August 10. *Post-mortem* examination seventeen hours after death: Slight emaciation; commencing decomposition. Lungs slightly congested; heart healthy, a fibrinous clot in the left ventricle. Stomach and liver healthy; spleen firm but nearly double its normal size. Peyer's patches in the lower part of the ileum ulcerated, the surrounding mucous membrane much congested and the corresponding mesenteric glands enlarged. Cæcum presenting one ulcer; the remainder of the large intestine healthy.—*Act. Ass't Surg. J. H. Hutchinson, Satterlee Hospital, Philadelphia, Pa.*

Case 173.—Private John Flowers, Co. M, 5th Pa. Cav., was admitted June 9, 1862, with rheumatism, and died July 29 of typhoid fever. *Post-mortem* examination on the day of death: Effusion of serum into the pericardium, amounting to about one-third of a pint or more; no evidence of pericarditis except a more than usual redness of the surface of the left ventricle; indications of a recent pleurisy, with the formation of pseudo-membrane on the right side, the corresponding pleural cavity filled with serous effusion. The mucous membrane of the large intestine presented patches of inflammation but no ulceration; that of the ileum was more intensely inflamed and all the agminated glands were ulcerated, in most instances as far as the muscular coat and in two instances to the peritoneum, though the latter was not inflamed.—*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 174.—Private George Young, Co. and Reg't not recorded, was admitted Aug. 10, 1862, and died on the 13th. He was delirious from the time of his admission. *Post-mortem* examination same day: Age apparently between 35 and 40; body much emaciated; about a dozen scattered rose-colored spots on thorax and abdomen. The organs of the chest, the stomach, liver, spleen, pancreas and kidneys appeared natural. The small intestine was inflamed throughout; its agminated glands were ulcerated, the ulceration exposing the muscular coat; the mucous membrane of the lower part of the ileum was of a livid purple; the agminated glands, together with a portion of the surrounding mucous and sub-mucous tissue, were completely destroyed, leaving patches of exposed transverse muscular fibre inclosed by thickened ridges of the mucous membrane. [*Specimen* 239, Med. Sect., Army Medical Museum.] The lining membrane of the colon was slightly inflamed and of a slate-color. The solitary glands of the small and large intestines were not conspicuously diseased.—*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 175.—Private Benjamin Allen, Co. H, 1st Ohio, was admitted Dec. 23, 1862, with typhoid fever and erysipelas of head and face; he died on the 26th. *Post-mortem* examination next day: Body fat; left side of head and neck discolored by erysipelas. Brain healthy but pia mater somewhat injected on left side and slight effusion in sub-arachnoid space. Lungs and heart, liver, stomach, pancreas and kidneys healthy. Spleen enlarged, seven by five by two and a half inches, very flabby, bluish on the surface and marked with dark reticular lines; mucous membrane of ileum and colon moderately inflamed; intestinal glands healthy except in the lower three feet of the ileum, where the agminated glands were much enlarged and ulcerated. [*Specimens* 112–114, Med. Sect., Army Medical Museum, are from this case.]—*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 176.—Private Sidney Church, Co. A, 189th N. Y.; admitted Jan. 17, 1865; died 21st. *Post-mortem* examination: Lungs normal; heart flabby; liver healthy; spleen fourteen ounces, softened; duodenum and jejunum healthy; Peyer's patches of ileum ulcerated, the ulcers cup-shaped and round; ileo-cæcal valve much thickened; colon for eighteen inches filled with clotted blood, below which the solitary follicles were not enlarged.—*Ass't Surg. H. Loewenthal, U. S. V., Fifth Army Corps Field Hospital, Army of Potomac.*

Case 177.—Private Silas N. Peterson, Co. D, 38th Mass.; age 25; was admitted Nov. 5, 1862, with typhoid fever, and died on the 10th. *Post-mortem* examination: Inflammation and ulceration of Peyer's patches and of the colon near the caput; much enlargement of the mesenteric glands.—*Act. Ass't Surg. T. F. Murdoch, Stewart's Mansion Hospital, Baltimore, Md.*

Case 178.—Private C. M. Kelsey, Co. M, 14th N. Y. Heavy Art., was admitted July 24, 1864, having been sick since the 7th with diarrhœa and fever. He died on the 28th. *Post-mortem* examination on day of death: Lungs and heart healthy. Peyer's patches were inflamed and slightly ulcerated; several ulcers were found in the large intestine; the mesenteric glands were much enlarged and softened. The spleen was five inches long by three broad and rather soft; the kidneys were large and fatty.—*Fairfax Seminary Hospital, Va.*

Case 179.—Private H. Richardson, Co. C, 13th E. Tenn. Cav., was admitted Jan. 22, 1864, with typhoid fever, and died February 6. *Post-mortem* examination forty-eight hours after death: Body emaciated; rigor well marked. The brain, lungs, heart and solid abdominal viscera were healthy. The stomach was injected; Peyer's patches ulcerated throughout the entire length of the ileum; the mucous membrane of the large intestine inflamed and thickened; the mesenteric glands enlarged.—*Act. Ass't Surg. G. W. Roberts, Hospital No. 19, Nashville, Tenn.*

Case 180.—Private Robert Traut, Co. A, 10th E. Tenn. Cav., was admitted Jan. 29, 1864, with typhoid fever. He died February 6. *Post-mortem* examination twenty hours after death: Body emaciated; rigor slight. The membranes of the brain were slightly injected. The lungs weighed sixty ounces and the pleural cavities contained

two ounces of liquid; the heart was healthy. The liver was pale but seemingly healthy; the spleen congested, weighing fifteen ounces; the kidneys, especially the left, congested. The mucous membrane of the stomach was inflamed and softened, as was that of the small intestine and colon; Peyer's glands were ulcerated and the mesenteric glands, in some instances, as large as a chestnut.—*Act. Ass't Surg. G. W. Roberts, Hospital No.* 19, *Nashville, Tenn.*

Case 181.—Private Ira A. Sperry, Co. D, 147th N. Y.; age 24; was admitted June 15, 1863, with typhoid fever, and died on the 22d. *Post-mortem* examination twenty-five hours after death: Body not emaciated. Brain healthy. Mucous membrane of trachea much congested; upper lobe of right lung somewhat congested, middle lobe more natural, lower lobe extremely congested, weight of lung sixteen ounces; upper lobe of left lung congested, weight of lung fifteen ounces and a half. Right cavities of heart contained fibrinous clots; left mixed clots. Liver, sixty-five ounces, flabby, mottled cineritious and deep purple; about the middle of the anterior surface of the right lobe was a large white spot coated with lymph, indicative probably of previous inflammation. Œsophagus normal; stomach of a dull gray color; spleen firm, dark mahogany colored, weight eleven ounces and a quarter, an opaque spot covered with recent lymph on its upper surface; pancreas firm and white, weight two ounces and a half. Duodenum somewhat congested; jejunum and upper part of ileum normal; mucous membrane of lower part of ileum thin, pale and easily torn; Peyer's patches elevated, dark slate-colored; solitary glands prominent; ulceration present but nowhere extensive. Large intestine dull greenish in color but not ulcerated. Left kidney flabby, slightly injected, somewhat friable and with many ecchymosed blotches on pelvis; bladder much distended with urine.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 182.—Private William Gibbings, Co. F, 5th Mich.; age 35; was admitted April 21, 1864, with typhoid fever, and died May 12. *Post-mortem* examination twenty-three hours after death: The brain weighed fifty ounces. The mucous membrane of the larynx and trachea was somewhat congested. The right lung weighed thirty-two ounces, its lower lobe hepatized red, its upper lobe gray and the pleural surfaces adherent; the left lung weighed nineteen ounces. The heart was flabby; there were three drachms of light-red fluid in the pericardium. The œsophagus was healthy; the cardiac end of the stomach reddish-brown and much softened; the mucous membrane of the duodenum much congested; the solitary follicles of the ileum and Peyer's patches ulcerated, some of the ulcers penetrating to the peritoneum; a small triangular piece of bone was found in the appendix vermiformis; the mucous membrane of the large intestine was much congested and softened. The liver, fifty-nine ounces and a half, was flabby and anæmic; there were six drachms of gamboge-colored liquid in the gall-bladder; the spleen eleven ounces and a half, was pulpy, its capsule easily separated and presenting on its superior surface a "round white body resembling bone." The right kidney weighed five ounces, the left five ounces and a half; both were soft and flabby.—*Act. Ass't Surg. A. Ansell, Lincoln Hospital, Washington, D. C.*

Case 183.—Private Peter W. Backoven, Co. G, 8th N. Y. Cav.; age about 21; admitted Aug. 18, 1863; died 26th. *Post-mortem* examination: Body not much emaciated; rigor mortis great. The brain weighed fifty-one ounces and a half; the surface of the cerebellum was slightly red and the vessels of the pia mater filled with a purplish fluid; the interior of the brain was normal. The larynx and trachea were pale, the portions between the rings of a light purple hue. The œsophageal mucous membrane was pale gray in the upper part, becoming tawny or purplish further down, and considerably corrugated both longitudinally and transversely. The right lung weighed eleven ounces and a half, the left twelve ounces and a half; both were somewhat congested in their lower lobes. The heart was healthy, its right ventricle contained a fibrinous clot; the liquid of the pericardium was decidedly reddish in color and measured six drachms. The liver weighed fifty-seven ounces, its surface purple with a few scattered yellowish maculæ, its section paler than usual but firm; the mucous membrane of the stomach near the pylorus was somewhat marbled; the spleen, nineteen ounces and a half, was firm and of a chocolate color; the pancreas was normal. Peyer's patches in the lower part of the ileum were elevated, white and covered with small ulcerations, a few of the patches were congested; the large intestine was purple in its upper part, becoming paler towards the rectum. The kidneys were firm; on section a small quantity of venous blood flowed from the cut edges of the pyramids; the right supra-renal capsule was yellowish-white internally and did not contain the usual brown fluid; the left capsule was darker in color and contained a small quantity of brownish fluid.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 184.—Private Abram Becker, Co. H, 14th U. S. Inf.; age 39; was admitted May 11, 1864, with a gunshot flesh wound of the left heel. He contracted typhoid fever while in hospital, but had apparently convalesced; his appetite improved, and he gained strength during the last two days of his life; he was walking about within ten minutes of his death on July 30. *Post-mortem* examination seventeen hours after death: Body well nourished. The lungs contained much frothy, bloody fluid; the right weighed nineteen ounces and three-quarters, the left nineteen ounces. The heart was flabby and contained a small soft fibrinous clot in the right ventricle. The liver was flabby and dark-colored; the spleen weighed thirteen ounces and three-quarters. In the ileum Peyer's patches were congested, near the ileo-cæcal valve ulcerated; some of the solitary glands also were ulcerated. The large intestine was somewhat congested in its upper portion.—*Act. Ass't Surg. H. M. Dean, Lincoln Hospital, Washington, D. C.*

Case 185.—Private Jos. S. Nelson, 6th Me. Bat'y; age 45; was admitted Oct. 19, 1863, with typhoid fever, and died Nov. 24. *Post-mortem* examination next day: Body greatly emaciated. The brain was healthy. The epiglottis was lined on the posterior surface with an exudation and ulcerated on either side of the free border, the ulceration being confined to the mucous membrane, which was of a palish pink color and thickened around the edges of the ulcers; an irregular ulcer, with pinkish walls, was seen on the left side of the larynx immediately below the vocal cord and a smaller ulceration of similar appearance in the angle of the thyroid cartilage. The posterior portion of

the pharynx opposite the epiglottis was the seat of a superficial ulcer; the œsophagus was pale and filled with a whitish curd-like mass, at first supposed to be a retained portion of ingesta, but on careful examination found to be a true exudation. The right lung weighed twenty-seven ounces; the posterior part of its upper lobe was quite œdematous, its bronchi prominent, feeling like millet-seed under the fingers, and their mucous lining everywhere of a dark-purple color; the posterior surface of the lobe was coated to the extent of an inch and a half with a thick whitish membrane; the lower lobe posteriorly was much compressed by a circumscribed pleuritic effusion measuring fourteen ounces. The weight of the left lung was thirty-two ounces; its upper lobe presented the same general appearance as that of the right side: the bronchial tubes were everywhere prominent, in some parts giving the feel of a cirrhosed liver; the lower portion of the lung was of a dark-purple flesh-color, friable and heavier than water. The heart contained but little clot in its right side and none in its left. The liver was dark and tolerably firm, weighing fifty-seven ounces; the gall-bladder was very prominent and contained twenty drachms of thin brown bile; the spleen weighed seven ounces and was of a dark mahogany color and quite firm. Peyer's patches and the lower portion of the small intestine were ulcerated; the large intestine was also ulcerated and of a stone-gray hue alternating with patches of a dull lardaceous appearance; the ulceration was of the punctated form. A large gangrenous abscess was found on the right of the anus extending deeply into the right buttock; its external opening was small. Just before death a severe hemorrhage had taken place from this abscess; several very large, firm, blackish clots were found in its cavity. It was supposed from the examination that this communicated with the rectum, but the passage to that gut was obtained with some difficulty, and it is not improbable that the force used in manipulation produced the communication. No flatus or excrementitious matter had escaped during life.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 186.—Private Martin Stevens, Co. D, 7th N. C.: age 33; was admitted May 20, 1864, with typhoid fever, and died on the 24th. *Post-mortem* examination sixteen hours after death: Body rather spare. Lungs congested throughout; left ventricle of heart dilated; small intestine much inflamed; solitary follicles and Peyer's patches ulcerated; large intestine inflamed; mesenteric glands enlarged and softened; liver and kidneys normal; spleen much enlarged and congested.—*Lincoln Hospital, Washington, D. C.*

Case 187.—Sergeant John Link, Co. A, 107th Ohio, was admitted June 15, 1863, delirious, and died on the 17th. *Post-mortem* examination ten hours after death: The brain was normal. The trachea was purple; its mucous membrane firm; the bronchial glands at its bifurcation large. The lower part of the œsophagus was of a pale yellowish color and presented ulcers of the same hue; its mucous membrane was not softened. The right lung weighed nineteen ounces and a half and was congested in its lower and in part of its upper lobe; the lower lobe of the left lung was somewhat engorged. The heart was normal and contained a fibrinous clot in its right side. The liver was large and dark-colored, extending entirely across the body; the gall-bladder contained three ounces and six drachms of bile. The stomach was immensely distended and occupied the greater portion of the abdomen in an oblique position; its mucous membrane was softened and presented several minute black spots towards the pylorus; between its superior curvature and the gall-bladder was a small quantity of recent lymph. The small intestine was contracted; its mucous membrane was softened and varied in color from light pink to deep purple; the jejunum was filled with a glairy tenacious mass; the last two feet of the ileum presented well defined ulceration of Peyer's patches, the ulcers being mostly circular with ragged walls and an irregular base, which was generally stained of a dull-ochre color by the intestinal contents; near the ileo-cæcal valve several of the ulcers ran together, forming a large ulcerated area, which, with its black indurated walls and yellowish base, stood out in strong relief against the purple, livid and congested mucous membrane. The large intestine was also much contracted, its rugæ elevated and coated with a tenacious mucoid secretion; no ulcers were found in it. The right kidney was congested, and several small spots of transuded blood were noticed on its external surface; the pelvis of the left kidney was similarly discolored.—*Ass't Surg. H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 188.—Private John Walford, Co. F, 2d U. S. Colored troops, was admitted Jan. 17, 1866, in a moribund condition; tongue parched; teeth and lips covered with sordes. Stimulants were freely used, but he died next day. There is no detailed record of the autopsy, but the whole intestinal canal was received at the Museum. The ileum showed hypertrophied villi and progressive thickening and ulceration of the solitary follicles and Peyer's patches; many solitary glands in the colon were enlarged to the size of peas and ulcerated on their summits. [See Med. Sect., Army Medical Museum, 707 and 708.]—*Surg. R. B. Bontecou, U. S. V., Harewood Hospital, Washington, D. C.*

Case 189.—Corporal Walter Angel, Co. K, 10th N. Y. Cav.; admitted Aug. 17, 1863, with typhoid fever. Died 20th. *Post-mortem* examination: Body slightly emaciated. The lungs, heart and pericardium were normal. The liver was congested; the gall-bladder somewhat distended; the spleen enlarged and congested, weight eleven ounces. The mesenteric and meso-colic glands were much enlarged and there was considerable venous congestion of the intestinal peritoneum. The mucous membrane of the lower jejunum and ileum was congested in patches, the congestion increasing progressively downwards, the last two feet being much congested, with, in the last six inches, several deep circular ulcers having yellow bases and raised edges; Peyer's patches were not elsewhere ulcerated. The colon was of a deep mahogany color, especially in the ascending portion. The pyramids of the kidneys were congested, the cortical substance pale.—*Harewood Hospital, Washington, D. C.*

Case 190.—Private H. G. W. Stoner, Co. A, 14th U. S. Inf.; admitted Oct. 10, 1863, with typhoid fever. Died 13th. *Post-mortem* examination: The lungs were normal excepting a slight adhesion to the pericardium on the left side. The right cavities of the heart were dilated and filled with fluid blood; their walls were thinned. The liver weighed sixty-four ounces; the spleen twelve ounces. The stomach and the upper part of the duodenum were much congested. The ileum was congested, especially in its lower part, which was thickened and inflamed and in Peyer's patches

[illegible]: the ileo-cæcal valve was much thickened and ulcerated. The mucous membrane of the colon was congested and [illegible] and hundreds of its solitary follicles were ulcerated; the rectum also was congested and softened. The kidneys were congested.—*Harewood Hospital, Washington, D. C.*

Case 191.—Private Martin Riley, Co. C, 122d Pa.; admitted April 21, 1863. Continued fever. Died May 24. *Post-mortem* examination twenty hours after death: The body was much emaciated. The lungs were healthy, but the bronchial tubes contained a purulent secretion. The heart was softened and pale; a small point of pus was found at its apex; the mitral valve was thickened and slightly roughened. The stomach was nearly filled with bile. The liver was healthy: the gall-bladder nearly empty. The duodenum and jejunum were normal; the ileum inflamed and Peyer's patches ulcerated; the ascending colon congested in spots, the transverse and descending portions [illegible]. The kidneys were normal.—*Act. Ass't Surg. A. H. Haven, Harewood Hospital, Washington, D. C.*

Case 192.—[illegible] F. 175th Pa.; age 37; admitted July 6, 1863. Died 12th. *Post-mortem* examination [illegible] hours after death: [illegible]; gall-bladder distended with bile; spleen somewhat enlarged, much congested and very soft; duodenum and jejunum healthy; ileum much inflamed and its agminated and solitary glands [illegible]; some of the ulcers appeared to be healing; solitary follicles of ascending colon enlarged and ulcerated. Kidneys [illegible].—*Act. Ass't Surg. Lloyd Dorsey, Harewood Hospital, Washington, D. C.*

Case 193.—Private Frederick Wolfanger, Co. C, 93d N. Y.; age 43; was admitted Oct. 24, 1863, and died [illegible] after admission, [illegible] hours after death: Body much emaciated. Brain healthy. The left parietal bone was the seat of suppurative inflammation; the pus had discharged from two openings, one in the [illegible] over the temporal and the [illegible] the other externally, between the mastoid process and clavicle. The left lobe of the thyroid gland contained a tuberculous mass as large as a walnut, and in its upper portion a cyst the size of a pea, filled with a dark-brown fluid; the right lobe contained a cyst the size of a small chestnut, and in its lower portion an apoplectic extravasation one inch and a half long by one inch in width. The right lung weighed thirty-seven ounces and a half; its lobes were interadherent but not attached to the ribs; the lateral and posterior parts were [illegible]. The left lung presented the [illegible], but contained a greater quantity of blood in many places, the [illegible] being of a darker hue. The bronchial tubes were thickened and their mucous membrane reddish; a [illegible] was contained in the smaller tubes, giving a granular appearance to a section of the lung. [illegible] of the heart contained mixed [illegible] and dark clots; its muscular tissue was much softer than usual. The liver was [illegible]; the spleen soft, flabby and of a [illegible] purple color. The intestines were of a dark grayish color; Peyer's patches were ulcerated in places but were not elevated. The kidneys were slightly congested.—*Ass't Surg. E. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 194.—Private William Wagner, Co. F, 6th Mich. Cav.; age 28; was admitted July 30, 1863, with typhoid fever, and died August 3. *Post-mortem* examination eighteen hours after death: The brain weighed fifty-three ounces; [illegible] of the cerebrum were highly congested, especially in their superior and anterior portions, which were in part of a brilliant crimson color. The tracheal mucous membrane was of a deep dull-purplish red; the trachea and bronchi contained a thin bloody liquid instead of the normal secretion; the veins under the mucous membrane of the larynx were distended: the lymphatic glands at the bifurcation of the trachea were large, soft and engorged with dark blood. The lungs were of a delicate pink color; the external and lateral portions of the upper lobes and the [illegible] of the lower lobes were [illegible], semi-solidified and engorged with dark blood mixed with a frothy [illegible] secretion: the right lung weighed twenty-five ounces, the left twenty-four ounces. The cavities of the heart were free from clots, except a very thin wafer-like formation on the tricuspid valve. The liver was flabby and [illegible]; the spleen, sixteen ounces, was grayish-purple in color and unusually firm. The intestines were [illegible] the mucous membrane in the upper portion was flaccid, softened and easily torn, the valvulæ conniventes of an orange-ochre color: Peyer's patches were enlarged, elevated above the surrounding mucous membrane, [illegible] some of the [illegible] patches being larger than the head of a pin: the solitary glands were [illegible] and, in the neighborhood of the valve, the mucous membrane was completely nodulated [illegible]: the mucous membrane of the last six feet of the ileum, which was the part chiefly involved, [illegible] of a purplish color and its veins were very prominent. The kidneys were slightly congested, soft and flaccid.—*Ass't Surg. Benjamin Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 195.—Pvt. [illegible] Vincent Hogle, Co. E, 5th Mich.; age 33; was admitted March 24, 1864, and died on the 26th. *Post-mortem* examination: Lungs and pleuræ inflamed; much effusion in right cavity. Intestines inflamed [illegible]. Peyer's patches ulcerated.—*Third Division Hospital, Alexandria, Va.*

Case 196.—[illegible] John Sullivan, Co. B, 1st Mass. Cav., was admitted July 2, 1864, and died on the 11th. *Post-mortem* examination: Much emaciation. Lungs extensively inflamed; heart, liver and spleen healthy; stomach and [illegible] inflamed: Peyer's patches slightly ulcerated.—*Third Division Hospital, Alexandria, Va.*

Case 197.—[illegible] Lt. 1st [illegible]; age 19; admitted April 19, 1864; died 22d. *Post-mortem* examination [illegible] hours after death: The lungs, liver and spleen were normal. The glands of the intestines were enlarged [illegible] and a most disintegrated.—*Third Division Hospital, Alexandria, Va.*

Case 198.—[illegible] Amzo Wilkinson, Co. A, 20th Me., was admitted Aug. 21, 1864, having about five or six [illegible] which were [illegible] in the right side and slight dyspnœa; pulse 120; tongue dry and covered with a brown fur. The patient continued with but little change in his symptoms other than a temporary abatement of the diarrhœa and suppuration of the lung trouble, together with increasing prostration, until delirium came on, and death occurred on the 29th. *Post-mortem* examination six hours after death: Body not emaciated; rigor mortis

great. The right lung was generally congested and its middle lobe hepatized; the left lung was congested posteriorly. The pericardium contained two ounces of liquid; the right cavities of the heart were filled with a large partially washed clot. The liver was enlarged and pale; the gall-bladder distended with viscid bile; the spleen enlarged and soft. The stomach was inflated with gas, dilated and flabby, and its mucous membrane was reddened near the pylorus. In the lower half of the ileum the agminated glands were congested, enlarged and prominent, and those near the ileo-cæcal valve showed small ulcers; the mucous membrane around the glands was more or less congested according to its proximity or distance from the valve; the solitary follicles were enlarged and prominent. No ulcers were found in the large intestine, which, however, was congested throughout and dotted with black pigment, particularly in the descending colon, where an occasional large black spot appeared. [*Specimens* 398 and 399, Med. Sect., Army Medical Museum, were taken from this case.]—*Act. Ass't Surg. O. P. Sweet, Carver Hospital, Washington, D. C.*

Case 199.—Private Wm. S. Armstrong, Co. B, 7th Me.; age 21; was admitted June 14, 1863, with high fever and delirium, a furred and fissured tongue, sordes on the teeth, frequent retching and diarrhœa, the stools numbering about twenty daily. He was much emaciated and so weak as to be unable to sit up. During the next few days his stools became less frequent, but on the 19th the passages were involuntary, the delirium continued, the pulse, which had fallen from 120 to 80, was very weak, the countenance pinched, the extremities cool, the perspiration cold. He died on the 20th. *Post-mortem* examination fourteen hours after death: The brain was healthy. The mucous membrane of the œsophagus was of a bright-ochre color and rather softened; the trachea was of a dark-purple color, its mucous membrane slightly softened. The lower lobe of the right lung and the whole of the left lung were congested. The endocardium was somewhat darkened; the right ventricle contained a fibrinous clot; the aorta was reddish. The surface of the liver was generally of a grayish-blue color, but anteriorly the right lobe presented a more healthy appearance; minute collections of air were disseminated throughout the parenchyma of this organ, which was softened, of the color of sanious pus and possessed of a disagreeable odor; the air-cavities and the transverse section of the portal veins gave a honey-combed appearance to the interior; Glisson's capsule was smooth and easily torn. The mucous lining of the stomach was of a dark-slate color but healthy. The spleen, fifteen ounces and a half, was unusually firm and of a deep mulberry color; the pancreas was healthy. The intestines were distended with air; the mucous membrane of the upper portion of the small intestine was of a light-yellow color; in the lower third Peyer's patches were ulcerated and the mucous membrane, in some places very pale, was in others intensely injected; at the ileo-cæcal valve it was indurated, thickened and blackened and in the large intestine pale and irregularly dotted with blackish spots. A cavity containing about four drachms of pus was found between the peritoneum and the cellular tissue on the right side of the abdomen, about two inches below the diaphragm; the omentum was healthy. The kidneys resembled the liver in having air-cavities disseminated through their parenchyma; the distinction between the cortical and pyramidal portions was almost obliterated, the latter being purplish; the organs generally were tumid and flabby. Two large bed-sores were noted, one over the sacrum, the other over the great trochanter of the right femur.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 200.—Private R. L. Tyler, Co. E, 17th U. S. Inf.; age 23; was admitted Aug. 10, 1862, and died on the 16th. *Post-mortem* examination: The mucous membrane of the ileum was not generally inflamed, being of a pinkish-cream color; there were twenty-two agminated glands, varying in size from half an inch to one which was four inches in length; the twelve upper patches were healthy, the thirteenth ulcerated, the fourteenth healthy and the remainder ulcerated, some even through to the peritoneum; the last of the series, near the ileo-cæcal valve, formed a blackish-brown, irregular eschar about an inch and a quarter square and the fourth of an inch thick [see plate facing this page]; in the vicinity of the ulcerated glands the mucous membrane was inflamed. The colon was inflamed in patches, and its solitary glands were prominent and contained a deposit of black pigment, which was observed also in the agminated and solitary glands of the ileum. [*Specimens* 240 and 241, Med. Sect., Army Medical Museum, are from this case.]—*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 201.—Private Lorenzo H. Cox, Co. C, 6th Vt.; admitted August 10, 1862. Typhoid fever. Died Sept. 7. *Post-mortem* examination next day: Age about 25 years; emaciation extreme; diffuse ecchymoses on skin of body. Lungs healthy; heart natural, containing some liquid blood and a soft black clot in the right ventricle. Spleen small, lake-red on section; liver dull-brown above, slate-color below and uniformly brown on section. Stomach moderately distended, its mucous membrane dirty gray with some vascular injection; ileum and colon inflamed in patches; agminated glands containing black deposit, but otherwise healthy, except two near the colon, which were slightly ulcerated; solitary glands everywhere pigmented.—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 202.—Sergeant Samuel Kelley, Co. E, 23d N. Y., was admitted Dec. 23, 1862, with a gunshot wound, and died Jan. 15, 1863. *Post-mortem* examination next day: Age about 30 years; no emaciation; a few faint reddish spots on the abdomen. Vessels of brain distended with blood. Lungs and heart healthy. Liver pale Indian-red on surface and on section; spleen enlarged, six by four by two and a half inches, rather soft and on section like black currant-jelly. Colon pale gray with slate-colored streaks and reddish spots, its solitary glands containing black matter; ileum generally pale, but with streaks and patches of moderate inflammation, its solitary glands enlarged, some to the size of pepper grains, and its agminated glands enlarged, several ulcerated and with ochre-yellow adherent granulations.—*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 203.—Private Moses Burkett, Co. A, 12th U. S. Inf.; admitted Aug. 10, 1862. Typhoid fever. Died Sept. 9. *Post-mortem* examination same day: Age about 20 years; emaciation; slight petechial marks on breast and abdomen. Right lung with old pleuritic adhesions throughout; left with adhesions at apex of upper lobe; small tubercles, few in number, from the size of hempseed to that of a pea, deposited in the pleura pulmonalis, pleura costalis and superficial tissue of both lungs. Heart flabby, with a large, transparent, fibrinous clot in the left ventricle but none in the right.

Heliotype. *Stewart P. Sargent & Co., Boston.*

SLOUGHING PEYER'S PATCH.

Peritoneum everywhere strewed with small tubercles from the size of mustard-seed to that of hempseed, in greatest abundance in the pelvis, where they were accompanied with peritonitis, the bowels adhering by recent pseudo-membranous matter; mesenteric glands and, indeed, all the abdominal lymphatic glands, enlarged but not tubercular. Liver fatty, the acini in section appearing large, dull yellowish with brown centres; spleen natural. Stomach moderately contracted and not inflamed. Ileum with several small patches of moderate inflammation and one ecchymosed patch; agminated glands slightly thickened and the lower ones superficially ulcerated; solitary glands enlarged. Moderate inflammation in the cæcum and sigmoid flexure of the colon, the mucous membrane of the latter with a blackish blush, apparently from deposits of fine black pigment in the epithelial cells; solitary glands healthy and not blackened.—*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 204.—Thomas James, a nurse of ward 7, died Oct. 30, 1863, of peritonitis. *Post-mortem* examination eight hours after death: Age about fifty years; body well nourished; thyroid body enlarged on one side to the size of a hen's egg. Heart and lungs healthy; capacity of chest diminished by pressure of abdominal contents. Peritoneal surface everywhere reddened by turgid vessels and covered by thin, recent, cream-colored pseudo-membrane, with interstitial sero-purulent liquid; abdominal lymphatic glands not palpably diseased. Liver large, yellowish-brown, soft and somewhat fatty; gall-bladder small and partially collapsed; spleen flabby, on the surface bluish-white and with an old white cicatrix-like mark, which, together with the sub-serous tissue, was spotted with black maculæ, on section light Indian-red, remarkably bloodless and for half a line from the surface black from pigment deposited in molecular granules and round masses the size of blood corpuscles. Stomach, pancreas and kidneys healthy. Ileum and colon slightly more pink than normal; upper agminated glands healthy; glands of lower three feet of ileum ulcerated, the ulcers occupying only part of the surface, but extending to the muscular and serous coats and in one instance perforating the latter, the hole being circular and about a line in diameter. The blood contained, if anything, fewer white corpuscles than usual. [*Specimens* 234 to 236, Med. Sect., Army Medical Museum, are from this case.] —*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Phila., Pa.*

(C.) Condition of Peyer's patches not stated; the ileum or the small intestine ulcerated—22 cases.

Case 205.—Private Benjamin McCoy, Co. H, 46th Pa., was admitted Sept. 16, 1863, in low condition and cyanotic. Next day he became delirious, and soon afterwards ecchymoses appeared on the chest and abdomen. He died on the 22d. *Post-mortem* examination: Heart sound; parenchymatous organs healthy; a portion of the ileum ulcerated.—*Act. Ass't Surg. W. Leon Hammond, First Division Hospital, Alexandria, Va.*

Case 206.—Private Richard Boyer, Co. F, 149th Ohio National Guard; age 43; delirious and with a feeble intermitting pulse; diarrhœa profuse. Died August 31, 1864. *Post-mortem* examination sixteen hours after death: Lungs somewhat emphysematous on their periphery; pericardium thickened and containing four ounces of yellow liquid; heart enlarged but with no valvular derangement; lower third of ileum ulcerated, some of the ulcers nearly perforating, others almost cicatrized.—*Seminary Hospital, Columbus, Ohio.*

Case 207.—Private Levi Bentley, Co. E, 14th N. Y. Art.; age 18; was admitted June 11, 1864, with typhoid fever, and died on the 25th. *Post-mortem* examination twenty-four hours after death: Miliary tubercles in both lungs; ulceration of the ileo-cæcal valve and of the whole of the ileum. Heart, liver, spleen and kidneys normal.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

Case 208.—Private William Park, Co. F, 149th Ohio National Guards; age 37; was admitted May 30, 1864, and died June 26. *Post-mortem* examination twenty-four hours after death: Adhesions of the membranes of the brain and slight effusion of serum under the arachnoid. Lungs normal; heart natural, but the pericardium contained some effusion; liver much mottled; spleen normal. The lower part of the ileum was much congested but showed only one ulcer.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

Case 209.—Private James M. Cammell, Co. G, 11th Va.; age 22; was admitted Aug. 31, 1864, with typhoid fever, and died September 10. *Post-mortem* examination twenty-four hours after death: Effusion in the ventricles of the brain. Twenty-five ulcers in the ileum, which, for two feet above the ileo-cæcal valve, was intensely inflamed; the valve was one mass of ulcers.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

Case 210.—John Henry, contraband; age 22; was admitted Aug. 27, 1864, with typhoid fever, and died on the 30th. *Post-mortem* examination: Lungs congested; heart, liver and kidneys normal; spleen softened; small intestine congested and extensively ulcerated, especially near the ileo-cæcal valve.—*Chattanooga Field Hospital, Tenn.*

Case 211.—Spencer Jonaque, contraband; age 29; was admitted Aug. 18, 1864, with typhoid fever, and died on the 27th. *Post-mortem* examination: Lungs congested; heart, liver and kidneys normal; spleen softened; small intestine congested, softened and showing many minute ulcers.—*Chattanooga Field Hospital, Tenn.*

Case 212.—Private James Lock, Co. K, 22d Mich.; age 19; was admitted Aug. 10, 1864, with typhoid fever, and died on the 19th. *Post-mortem* examination on day of death: Lungs congested and lower lobe of left lung hepatized; heart flabby; liver and kidneys normal; spleen large and softened; mucous membrane of ileum softened and showing many ulcers of various sizes.—*Chattanooga Field Hospital, Tenn.*

Case 213.—Private David Cantwell, Co. A, 42d U. S. Colored troops; age 37; admitted Aug. 17, 1864; died 29th. *Post-mortem* examination on the day of death: Lungs universally and firmly adherent; heart, liver and kidneys normal; spleen one and a half ounces; mucous membrane of small intestine thickened, softened and showing several ulcers one-fourth to one-half inch in diameter.—*Chattanooga Field Hospital, Tenn.*

Case 214.—Private Fielding Childers, Co. D, 16th U. S. Colored troops; age 22; was admitted Sept. 2, 1864, and died on the 8th. *Post-mortem* examination on the day of death: The lower lobe of the right lung and part of

the upper lobe were hepatized; the lower lobe of the left lung was congested; the heart was flabby. The liver was softened; the spleen, eighteen ounces, was softened and had two large cysts on its surface. The mucous membrane of the small intestine was softened, congested and studded with numerous small ulcers. The kidneys were normal.—*Field Hospital, Chattanooga, Tenn.*

Case 215.—Private Henry W. Shedron, Co. E, regiment not stated, was admitted Oct. 14, 1864, as a convalescent from typhoid fever. He was greatly emaciated and had slight chills every day followed by high fever and night-sweats. On the 16th he complained of pain in the chest; diarrhœa set in next day, and he died on the 22d. *Post-mortem* examination eight hours after death: Right lung hepatized throughout; ulcers and an old cicatrix in the small intestine.—*Hospital No. 8, Nashville, Tenn.*

Case 216.—Private Simeon M. Van Horn, Co. F, 141st Pa.; admitted Oct. 14, 1862; died 24th. *Post-mortem* examination: The mucous membrane of the small intestine was much softened and presented many ulcerated patches. The mesentery was highly congested; the mesenteric glands enlarged; the spleen twice the usual size, much engorged and easily broken down; the liver enlarged and friable.—*Third Division Hospital, Alexandria, Va.*

Case 217.—Recruit John H. Skillington, 49th Pa.; age 25; was admitted Sept. 9, 1864, with typhoid fever. He fell into an unconscious state, and died on the 14th. *Post-mortem* examination one hour and a half after death: Slight effusion beneath arachnoid at apex; three small, flat, strong deposits in anterior part of posterior commissure in front of pineal gland; a dirty looking clot in the heart; gray hepatization of posterior part of upper lobe of right lung and minute red-brown interlobular infiltrations in posterior part of lower lobe; liver large; spleen large, dark and hard; kidneys pale; ileum, near ileo-cæcal valve, showing patches of congestion and ulcers with thickened and reddened borders; colon normal.—*Third Division Hospital, Alexandria, Va.*

Case 218.—Private Benedict Gehrich, Co. D, 67th Pa.; admitted April 24, 1865. Typhoid fever. Died 29th. *Post-mortem* examination: Rigor mortis well marked; integuments excoriated; patches of denuded muscle here and there. Lungs, heart and stomach healthy. Spleen enlarged to three times the usual size, congested; small intestine slightly ulcerated at several points.—*Depot Field Hospital, Sixth Army Corps, City Point, Va.*

Case 219.—Private Frederick Wombeyer, Co. F, 41st N. Y., was admitted March 15, 1865, and died on the same day. *Post-mortem* examination twenty-four hours after death: The lungs were filled with blood and frothy serum; there were adhesions on the right side, and eight ounces of serum in each pleural sac; the heart was pale and contained a small clot. The liver was normal; the lower portion of the ileum was entirely denuded; the kidneys were inflamed and contained pus.—*Depot Field Hospital, Sixth Army Corps, City Point, Va.*

Case 220.—Private John Fitzsimmons, Co. D, 102d Pa.; admitted March 15, 1865. Diagnosis—typhoid fever. Died 28th. *Post-mortem* examination forty-eight hours after death: The lungs were healthy, but there were pleuritic adhesions on the left side; the heart contained large fibrinous clots in all its cavities. The liver was pale, almost fatty; the spleen normal. The intestines were normal except the last two feet of the ileum; near the ileo-cæcal valve the gut was entirely denuded of membrane and covered with greenish slime. The left kidney was pale; the right contained a large abscess.—*Depot Field Hospital, Sixth Army Corps, City Point, Va.*

Case 221.—Private Robert E. Shaw, Co. K, 111th N. Y.; age 23; was admitted June 26, 1863, with typhoid fever, and died August 10. *Post-mortem* examination twenty-five hours after death: Body rigid, not emaciated. Lungs normal excepting cadaveric changes, right weighing eighteen ounces, left seventeen ounces; right cavities of heart containing a large clot, fibrinous with a bloody admixture, extending a long distance into the pulmonary artery. Liver pale and flabby; spleen soft and decomposing; small intestine healthy to within four feet of the ileo-cæcal valve, below this point extensive typhoid ulceration existed, the ulcers being superficial and situated for the most part in the centre of large congested patches; large intestine healthy; kidneys very soft and flabby, congested in their cortical substance.—*Ass't Surg. H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 222.—Private H. Mortenson, Co. G, 27th Wis.; age 32; was admitted May 10, 1863, with parotitis, a sequel of fever. An infusion of frostwort *(Helianthemum Canadense)* was given and the affected parts painted with tincture of iodine. The patient would not permit any poultices or other applications to be used. An ichorish matter was discharged from both ears until death on the 18th. "*Autopsy* revealed softening of kidneys and a cavity containing fluid in right kidney; intussusception and ulceration of small intestine."—*Act. Ass't Surg. W. A. McMurray, City General Hospital, St. Louis, Mo.*

Case 223.—Private Wendilin Griesbaum, Co. F, 16th Ill. Cav.; age 43; was admitted Sept. 12, 1863, having had fever for ten days. As he was unable to speak English and was rather dull withal, but little account of his case could be obtained. Simple febrifuge remedies with quinine were ordered. Castor oil was administered on the 15th, as the bowels were constipated, painful, somewhat distended and hard. The abdominal symptoms were aggravated on the 16th, although the bowels had been moved in the meantime; the pulse was 100 and feeble. He died on the evening of this day. Dr. F. K. Bailey, attending surgeon, reports that "on inquiry among his comrades I learn that this man had been kicked, some six or eight months ago, in the abdomen by a fellow-soldier, and that he has been sick ever since." *Post-mortem* examination fourteen hours after death: Body emaciated; abdomen hard and very much distended; large quantities of bloody liquid oozing from mouth; skin in dependent regions livid. The thoracic viscera were normal. The peritoneal cavity contained a large quantity of bloody serum, pus and fæces; the omentum was livid and so tender as to scarcely hold together; the liver was twice the usual size and could be easily broken down by the finger; the spleen was discolored but not enlarged. The stomach was distended to double the normal size; the ileum perforated near its union with the large intestine. The kidneys were healthy.—*Hospital, Quincy, Ill.*

PERFORATING ULCER OF THE LIVER.

The right hand piece shows the aperture in the peritoneal surface.

CASE 224.—Private Eli W. Whiting, 5th Me. Bat'y, was admitted Sept. 1, 1862, with a gunshot wound received at the battle of Bull Run. He was sent to his home on furlough November 12, and was there taken very sick. He returned to hospital February 6, 1863, in a debilitated condition. On March 18 he was attacked by fever and a severe pain in the præcordial region. On the morning of the 24th he had a chill, and the seat of the pain changed to the umbilical and hypogastric regions; he lay on his back with his knees drawn up and the abdominal walls motionless in respiration; his face was pale and contracted, showing great distress and anxiety; pulse frequent and small; tongue red at the tip and edges and furred with yellow in the centre; thirst extreme; bowels constipated; he had much nausea and vomited a greenish offensive matter. He was conscious until within an hour of his death, which took place on the evening of the 25th. *Post-mortem* examination: A large quantity of serum and pus was found in the peritoneal cavity; the peritoneum was thickened and congested; it presented a brilliant red appearance over some parts of the small intestine and a deep-red, almost black, appearance over other parts. The ileum for about five feet from the cæcum was more or less ulcerated; it was perforated by a large ulcer at a point eighteen inches from the ileo-cæcal valve. [See *specimen* 147, Med. Sect., Army Medical Museum, and plate facing this page.] —*Med. Cadet Abner Thorp, U. S. A., Columbian Hospital, Washington, D. C.*

CASE 225.—Private Joseph Fair, Co. L, 14th Pa. Cav.; age 52; was admitted July 25, 1863, with delirium, tremors and diarrhœa. He died August 3. *Post-mortem* examination ten hours after death: Lower lobe of right lung hepatized; liver hypertrophied; gall-bladder enormously enlarged, six to eight inches long; ileum ulcerated and perforated. [Gall-bladder forms *specimen* 37, Med. Sect., Army Medical Museum.]—*Ass't Surg. DeWitt C. Peters, U. S. A., Jarvis Hospital, Baltimore, Md.*

CASE 226.—Corp'l Paul Granvet, Co. D, 1st N. J., was admitted Aug. 9, 1862, having suffered from diarrhœa and fever at Harrison's Landing. After his admission he did well, recovered his appetite, increased in flesh and strength, and appeared in fact entirely convalescent; but during the afternoon of the 31st he was suddenly seized with violent pain in the abdomen, quick pulse, prostration and vomiting. Under the use of opiates and restoratives he was relieved from pain, but the abdomen became tumid. He continued to sink, and died during the night. On the day of this attack the patient took an unusually large meal of meat, which he did not chew sufficiently, and which he vomited in pieces as large as a shellbark. "The *autopsy* revealed three large patches of ulceration, two of which had perforated the small intestine, producing intense peritonitis."—*Satterlee Hospital, Philadelphia, Pa.*

(D.) Condition of Peyer's patches not stated; the ileum or the small intestine ulcerated and the large intestine also affected—19 *cases.*

CASE 227.—Private Albert Turner, Co. A, 42d U. S. Colored troops; age 48; was admitted Aug. 31, 1864, with typhoid fever, and died September 2. *Post-mortem* examination on day of death: Right lung congested and at points hepatized; left lung normal; heart pale and flabby. Liver congested and somewhat softened; spleen enlarged and softened; kidneys enlarged but firm, weight of each nine ounces. Lower ileum ulcerated in patches; mucous membrane of ascending and transverse colon thickened and softened.—*Chattanooga Field Hospital, Tenn.*

CASE 228.—Charles Lancaster, contraband; age 28; was admitted Sept. 2, 1864, with typhoid fever, and died on the 10th. *Post-mortem* examination next day: Left lung partly hepatized; lower lobe of right lung congested; heart normal. Liver congested and softened; spleen weighing two ounces; left kidney presenting a small cyst filled with pus. Large intestine congested and softened; ileum ulcerated, the ulcers measuring two to three inches in their long diameter.—*Chattanooga Field Hospital, Tenn.*

CASE 229.—Private Ire Campbell, Co. K, 16th U. S. Colored troops; age 20; was admitted Aug. 27, 1864, with typhoid fever, and died on the 30th. *Post-mortem* examination on day of death: Lungs somewhat congested; heart normal. Liver congested and softened; spleen much softened; kidneys normal. Large and small intestines ulcerated, some of the ulcers being one-fourth inch in diameter.—*Chattanooga Field Hospital, Tenn.*

CASE 230.—Private Richard Weatherford, Co. D, 42d U. S. Colored troops, was admitted Aug. 14, 1864, with typhoid fever, and died on the 17th. *Post-mortem* examination: Lungs congested; heart flabby. Liver and kidneys normal; spleen softened. Intestines congested and softened, ileum ulcerated.—*Chattanooga Field Hospital, Tenn.*

CASE 231.—Private Frederick H. A. Steel, Co. D, 15th Pa. Cav., was admitted Aug. 16, 1864, with typhoid fever, and died on the 18th. *Post-mortem* examination next day: Lungs much congested; heart and liver normal; spleen softened; right kidney somewhat congested, left kidney congested and fatty; mucous membrane of intestines softened and congested, that of ileum presenting ulcers, some small and others with a long diameter of two inches and a half.—*Chattanooga Field Hospital, Tenn.*

CASE 232.—Private Samuel Hurto, Co. B, 10th U. S. Inf.; age 21; was admitted July 2, 1864, from City Point. Diagnosis—typhoid fever. Died 11th. *Post-mortem* examination eleven hours after death: Extreme emaciation. The intestinal canal was inflamed and presented several indurated ulcers in the cæcum, colon, rectum and ileum. The other organs were in a normal condition. [*Specimen* 421, Med. Sect., Army Medical Museum, is from this case.]—*Surg. E. Bentley, U. S. V., Third Division Hospital, Alexandria, Va.*

CASE 233.—Private George Martin, Co. B, 110th Ohio, was admitted Aug. 10, 1864, unconscious, and died next day. *Post-mortem* examination: Much emaciation. Considerable thickening of the intestinal mucous membrane and extensive ulceration of the ileum, cæcum and colon.—*Third Division Hospital, Alexandria, Va.*

CASE 234.—Corporal William Powell, Co. K, 10th N. Y. Cav.; age 43; admitted July 13, 1864. Diagnosis—typhoid fever. Died 24th. *Post-mortem* examination: Great emaciation. Slight adhesions of right pleura and extensive inflammation of lower lobe of right lung. Numerous and large ulcers in the intestines, extending from about

two feet above the cæcum to the anus, and two intussusceptions of the ileum, recent in appearance. Liver enlarged and fatty; spleen very much enlarged and congested.—*Third Division Hospital, Alexandria, Va.*

Case 235.—Private George Fox, Co. K, 2d N. Y. Mounted Rifles; admitted July 23, 1864; typhoid fever. This patient was delirious on admission, and continued so until he died comatose on the 29th; vibices appeared on the chest on the 27th and became darker and more extensive during the following day. *Post-mortem* examination twenty hours after death: Much emaciation. Inflammation and ulceration of the mucous coat of the ileum and colon, in some places nearly perforating; other organs not seriously diseased.—*Third Division Hospital, Alexandria, Va.*

Case 236.—Private Frederick Bingal, Co. I, 5th U. S. Cav.; age 24; was admitted June 26, 1863, in the last stage of typhoid fever—pulse 110 to 140; muttering delirium, with subsultus. *Post-mortem* examination twenty-four hours after death showed "considerable hepatization of the lungs, with extensive softening of the mesenteric glands and ulceration of the intestines."—*Act. Ass't Surg. A. P. Crafts, Third Division Hospital, Alexandria, Va.*

Case 237.—Private Isaac F. Blasdale, Co. C, 156th Ind.; age 18; was admitted June 16, 1865, in an extremely weak and exhausted condition, having been sick in camp for ten days before admission. His tongue and lips were pale and dry, the former covered with a white fur; he had great thirst; his pulse was very quick, small and feeble; his respiration hurried, and his dejections small, liquid and frequent. He died on the 20th. *Post-mortem* examination sixteen hours after death: The spleen was large, soft and very dark; the mucous membrane of the ileum and cæcum was inflamed and ulcerated.—*Act. Ass't Surg. S. B. West, Cumberland Hospital, Md.*

Case 238.—Private William Fowler, Co. D, 91st Ohio; age 21; was admitted Aug. 21, 1864, with typhoid fever, and died September 22. *Post-mortem* examination twenty-four hours after death: Hypostatic congestion of both lungs; a quantity of serum in the left pleural cavity, two ounces in the pericardium, four ounces in the peritoneum. The liver was large and light-brown in color and the spleen large and congested. The whole of the large intestine was much thickened and its mucous surface covered with large elevated, hard and ragged ulcers; the ileum was softened, thinned and, for two feet from the ileo-cæcal valve, intensely congested, showing traces of numerous ulcers, some of which were healed.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

Case 239.—Private Alson Breedlove, Co. D, 13th E. Tenn. Cav., was admitted Jan. 22, 1864, with typhoid fever, and died February 4. *Post-mortem* examination twelve hours after death: Body much emaciated; cadaveric rigidity marked. The brain was healthy. The lungs weighed forty-one ounces; their apices were emphysematous and thin; bronchial tubes inflamed; heart healthy. The stomach contained two ounces of matter like coffee-grounds; its mucous membrane was inflamed and softened. The upper part of the small intestine was softened and ulcerated in small patches and contained two lumbricoid worms; the mucous membrane of the large intestine was thickened and softened in patches; the mesenteric glands were much enlarged. The liver was somewhat fatty; the spleen congested, weighing fifteen ounces; the kidneys normal; the prostate enlarged and containing one drachm of pus.—*Act. Ass't Surg. G. W. Roberts, Hospital No.* 19, *Nashville, Tenn.*

Case 240.—Serg't H. C. Rogers, Co. C, 16th Pa. Cav.; age 28; was admitted Aug. 18, 1863, with typhoid fever, and died on the 20th. *Post-mortem* examination fourteen hours after death: Body but little emaciated. Trachea slightly congested, purplish between the rings; right lung weighing seventeen ounces, its upper lobe greatly congested and its lower lobe almost solidified but lighter than water; left lung, eighteen ounces and a half, congested generally, emphysematous in lower part of upper lobe; right ventricle containing a fibrinous clot which extended into the pulmonary artery. Liver dark colored, its parenchyma stained around the portal veins; spleen firm, purple and conspicuously mottled on its surface with a darker hue. Ileum congested and extensively ulcerated, the upper ulcers being small, blackish and with depressed centres, while those near the ileo-cæcal valve had a long diameter of one and a half inches, in one of which the ulceration had penetrated to the muscular coat; cæcum and ascending colon, especially between the longitudinal bands, studded with superficial ulcers having dark-blue borders and an elliptic form, their long diameter, one to five lines, at right angles to the axis of the bowel. Right kidney anæmic and firm; left somewhat congested.—*Ass't Surg. H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 241.—Private David C. Hollenbeck, Co. E, 188th N. Y.; age 37; was admitted Jan. 30, 1865, having been under treatment for fever with his command for seven days before admission. He died February 5. *Post-mortem* examination: The lower lobe of each lung was congested; the right weighed twenty-two ounces, the left fourteen ounces. The liver, spleen and kidneys were healthy. The mesenteric glands were enlarged and congested. The stomach was congested and contracted; the duodenum and jejunum healthy, except that there was an intussusception, two inches long, about seven feet and a half from the stomach; there was a good deal of ulceration in the neighborhood of the ileo-cæcal valve; a few ulcers were scattered through the colon.—*Ass't Surg. M. L. Lord,* 140*th N. Y., Depot Field Hospital, Fifth Army Corps, City Point, Va.*

Case 242.—Private Charles Brown, Co. H, 9th Pa., was admitted Sept. 28, 1862, convalescing from typhoid fever. The patient was greatly debilitated with diarrhœa, but under a tonic treatment he improved slowly until within three or four days of his death, when he began to complain occasionally of faintness. On October 17, after visiting the water-closet, he lay down on bed and expired almost immediately. *Post-mortem* examination: Brain, lungs and stomach normal; walls of right ventricle of heart very thin and soft; intestines ulcerated to a moderate extent and showing signs of former ulceration.—*Ward Hospital, Newark, N. J.*

Case 243.—Private Jeremiah Thorndyke, Co. C, 12th Mass., was admitted Nov. 4, 1863, having been sick for some time. On admission his bowels were loose and he had pain in the chest and abdomen. Pills of tannin and opium were given, with opiate enemata, but on the 10th nausea and vomiting came on and continued with failing pulse, dyspnœa and hiccough until death on the 15th. *Post-mortem* examination: The right lung was congested,

the left ventricle was more of the right ventricle of the heart were as thin as glove-leather. The right lobe of the liver presented [illegible], and the ascending portion of the colon was gangrenous. The mucous membrane of the stomach and of the duodenum, from the pylorus down to the valvulæ conniventes, was pultaceous. The ileum was ulcerated: the lower end of the sigmoid flexure constricted. The left kidney was normal; the right kidney and suprarenal capsule showed traces of inflammation: the [illegible] of the bladder was very much [illegible].—*Act. Ass't Surg. W. Lem Hammond, First Division Hospital, Alexandria, Va.*

Case [illegible].—[illegible] U. S. Infantry, [illegible] N. Y.; age 22; was admitted April 22, 1863, with a profuse [illegible], which resisted remedies, intense pain and swelling in the hypogastric region and difficulty of micturition; he was in low condition, pulse 130. As the distention of the abdomen did not depend on accumulated urine hot [illegible] were applied, and on the 27th, fluctuation being apparent, an abdominal abscess was opened, giving issue to a sero-purulent discharge which continued for five days. He died May 1 with symptoms of peritonitis. [illegible] Examination: Abdomen filled with [illegible] and perforation in several places: fatty degeneration of the kidneys.—*Armory Square Hospital, Washington, D.C.*

Case [illegible].—[illegible] Co. C, 20th [illegible], was admitted Jan. 3, 1865, and died on the 30th. *Post-mortem* examination: Lungs collapsed and pale; left adherent to pericardium, weight ten ounces and a half; bronchi [illegible]; right sixteen ounces, middle lobe inflamed; heart ten ounces, clot in right ventricle. Liver, sixty-two ounces, healthy; gall-bladder filled with bile; spleen five ounces, healthy. Stomach and jejunum normal; ileum [illegible] patches, in some places the walls accumulated with pus and [illegible]; colon slightly inflamed at [illegible], mesenteric glands enlarged, filled with cheesy matter. Kidneys four ounces each; suprarenal capsules [illegible] softened.—*Fifth Army Corps Field Hospital, Army of Potomac.*

(E.) Condition of Peyer's patches not stated; the intestines congested or inflamed but not ulcerated—11 cases.

Case 246.—Private Daniel McCloud, Co. C, 17th U. S. Inf., was admitted Aug. 14, 1863, with typhoid fever. [illegible] and [illegible] watery [illegible]; pulse weak and frequent; extreme emaciation. He died on the 18th. [illegible] Lower portion of ileum highly congested and contracted, its submucous coat thickened and its mucous coat softened.—*Third Division Hospital, Alexandria, Va.*

Case [illegible].—[illegible] Mich. S. Infantry, Co. E, [illegible] W. Va.; age 21; was admitted Feb. 16, 1865, complaining of severe pain in the left side and in the back of the head. His skin was hot, pulse 110, frequent, small and compressible, [illegible] furred, tongue dry, red and cracked; his [illegible] were frequent, copious and liquid, his abdomen [illegible] and tender on pressure. A diaphoretic mixture was ordered, with tepid sponging of the body, cold to the head and [illegible] to the spine and nape of the neck. He became delirious during the night, his pulse increased and his tongue grew red and dry, and became covered with sordes. Quinine, oil of turpentine and carbonate of ammonia were given, with chlorate of potash as a mouth-wash. He died on the 20th. *Post-mortem* examination twenty-four hours after death: Body slightly emaciated. The vessels of the pia mater were filled with dark blood; the cerebrum and cerebellum were congested posteriorly. The lungs were congested; the lower lobe of the left lung was [illegible]. The stomach and intestines were distended with gas; extensive patches of inflammation were found in the jejunum and ileum. The spleen was very large.—*Act. Ass't Surg. S. B. West, Cumberland Hospital, Md.*

Case [illegible].—[illegible] Pennsylvania [illegible] Co. A, 23d W. Va.; age 20; was admitted Feb. 3, 1865, with typhoid fever. He was very feeble and aphonic, his tongue dry, skin hot, pulse 100, bowels loose and abdomen swollen and painful. Quinine, oil of turpentine, lead, opium and whiskey were given. Vomiting set in on the 7th and he died next day. *Post-mortem* examination two hours after death: Slight emaciation; good muscular development. The epiglottis was inflamed and [illegible] the lining membrane of the larynx and of the trachea as far as the bifurcation was similarly affected; the vocal cords were almost obliterated. The lungs and heart were healthy. The spleen was very large, weighing nineteen ounces; the liver enlarged and congested; the gall-bladder enormously distended with bile. There was no intestinal ulceration, but scattered patches of inflammation were found in the ileum. A large quantity of coagulated blood was extravasated in the lower portion of the abdominal recti muscles and in the intermuscular septa.—*Act. Ass't Surg. Sample Ford, Cumberland Hospital, Md.*

Case [illegible].—[illegible] Fisher, recruit, 9th Ohio; age 18; was admitted Nov. 30, 1864, with typhoid fever. There was [illegible] delirium, dusky countenance, parched tongue, cough, diarrhœa and tenderness over the abdomen. A grain of [illegible] was given every four hours, and on December 1 half an ounce of brandy three times daily was ordered, with [illegible] to moisten the tongue and poultices to allay abdominal pain, which had become severe. A day or two after the cough became [illegible] and there was dullness on percussion over the left side of the chest. The pulse became rapid and feeble and the [illegible] troublesome. A grain of lead with opium was added to the [illegible]. On the 5th the tongue, lips and mouth were very dry, the countenance livid, and bronchial râles were [illegible] over the left lung: but on the 14th an improvement took place, the tongue becoming moist and the diarrhœa [illegible]; pulse 120 and feeble. Next day he was apparently much better than at any time since his admission; but in the afternoon he was seized with intense pain in the back which caused him to make loud outcries. Hot cloths were applied and [illegible] administered. In an hour he seemed relieved, and remained comfortable until midnight, when the breathing became hurried. He died comatose two hours thereafter. *Post-mortem* examination thirty-six [illegible] hours after death. The [illegible] presented [illegible] of serum. The right lung was healthy; the left was firmly adherent to the costal pleura and diaphragm; the bronchial mucous membrane was inflamed throughout on the left and to [illegible] tubes on the right. The under surface of the diaphragm, the abdominal walls, the stomach, intestines and left half of the liver were covered with a thick layer of [illegible]. The spleen was of normal size but [illegible] several [illegible] filled with a soft, white, cheesy substance: two of these had ruptured into the

peritoneal cavity. The mucous membrane of the ileum was slightly inflamed: the colon was largely distended with gas.—*Ass't Surg. H. C. May, 145th N. Y., Hospital No. 8, Nashville, Tenn.*

CASE 250.—Private George Lubenk, Co. K, 4th Mich. Cav.; age 34; admitted Feb. 1, 1864. Typhoid fever. Died 17th. *Post-mortem* examination: Body moderately emaciated. Lungs, heart, stomach, liver, spleen and large intestine healthy; the small intestine and kidneys highly congested.—*Hospital No. 1, Nashville, Tenn.*

CASE 251.—Theodore Jeter, 4th Ind.; age 22; was admitted March 21, 1863. He became sick January 16, at Vicksburg, Miss., with typhoid fever, mild in form, but with a tendency to diarrhœa. Suppuration occurred in the parotid gland, and he died April 12. *Post-mortem* examination: Pleuritic adhesions on right side; heart fatty, right ventricle thinned. Ileum congested; colon congested and softened. Right parotid gland entirely broken down by suppuration, leaving the external carotid bare but intact.—*City Hospital, St. Louis, Mo.*

CASE 252.—Thomas J. Slaton, private of an Alabama regiment, admitted Oct. 29, 1864, with typhoid fever. Bowels tender and somewhat loose; tongue narrow, tremulous, dry, slightly furred and red; pulse 110, weak; he was dull and drowsy and became gradually weaker until death took place December 5. *Post-mortem* examination: Great emaciation. Abscess in left lung; atrophy of heart; congestion of bowels and enlargement of mesenteric and solitary glands: fatty degeneration of the liver: spleen small.—*Act. Ass't Surg. H. C. Newkirk, Rock Island Hospital, Ill.*

CASE 253.—Private William Brown, Co. I, 1st Ark.; died March 16, 1865. *Post-mortem* examination: The spleen was much enlarged; the bowels distended and in many places disorganized; the mesenteric glands enlarged. An abscess of the arm and shoulder had discharged a large amount of pus for some days before death; on incision great disorganization of the muscles was revealed.—*Act. Ass't Surg. H. H. Russell, Rock Island Hospital, Ill.*

CASE 254.—Private Milton L. Coon, Co. I, 85th N. Y.; age 23; was admitted Aug. 19, 1862, with typhoid fever. Died suddenly November 18. *Post-mortem* examination: Extensive inflammation of the lower part of the ileum and cæcum, with pin-head enlargement of the solitary follicles, [*Specimen* 153, Med. Sect., Army Medical Museum]; mesenteric glands enlarged; liver and kidneys fatty.—*Surg. A. C. Bournonville, U. S. V., Hospital Fifth and Buttonwood streets, Philadelphia, Pa.*

CASE 255.—Private Lewell Cates, Co. A, 12th Ky.; admitted April 24, 1865. Died May 7. The course of the disease was that of typhoid fever; shortness of breath was the only pneumonic symptom observed. *Post-mortem* examination thirty-six hours after death: No emaciation. Both lungs were congested, the left partially hepatized; the heart normal. The liver was enlarged, friable and resembled that of yellow fever; the spleen and kidneys were normal. The intestines were immensely distended with gas, and the mucous membrane of the ileum and colon was congested.—*Act. Ass't Surg. E. Holden, Ward Hospital, Newark, N. J.*

CASE 256.—Private Patrick Cady, Co. B, 35th Ill.; admitted July 23, 1864. Typhoid fever. Died September 22. *Post-mortem* examination: Body much emaciated. The intestinal mucous membrane was congested and inflamed, but not ulcerated, in the lower third of the ileum and in the colon. An abscess holding two ounces of light-colored pus was found in the right lobe of the liver. The other organs were normal.—*Hospital No. 8, Nashville, Tenn.*

(F.) Condition of Peyer's patches stated variously, but not ulcerated, and generally without ulceration of the intestines—12 *cases.*

(a.) Peyer's patches normal or healthy.

CASE 257.—Private Edwin A. Maxfield, Co. G, 7th Me.; age 27; was admitted Aug. 14, 1864, with remittent fever. On admission the patient had a weak, frequent pulse, a dry, coated tongue and loose passages of a light color. Next day he had fever and headache. On the 16th he became delirious and somewhat drowsy, and on the 18th he died comatose. He was treated with citrate of potash and nitre, cold lotions to the head, and afterwards with calomel, ipecacuanha, camphor and blisters to the back of the neck. *Post-mortem* examination nine hours and a half after death: Body not much emaciated; rigor mortis well marked. The base of the brain was covered with a thin layer of lymph, the pia mater was injected, the liquid in the ventricles opaque. The trachea contained a considerable quantity of whitish frothy sputa streaked with the color of prune-juice; the right lung weighed twenty-five ounces, its posterior portion much congested, its anterior margin normal; the left lung weighed twenty-three ounces and a half, its posterior and lower part in the state of red hepatization, the rest of the lung healthy. The pericardium contained two ounces of straw-colored serum; the right side of the heart a small fibrinous clot. The stomach, liver and spleen were normal in appearance; the last weighed nine ounces and a quarter. The kidneys were somewhat injected. The mucous membrane of nearly the whole of the small and large intestines was congested, but Peyer's patches and the solitary glands were normal.—*Act. Ass't Surg. H. M. Dean, Lincoln Hospital, Wash'n, D. C.*

CASE 258.—Private James H. Morrison, Co. B, 151st Pa.; age 26; was admitted June 17, 1863, with typhoid fever. [He entered Kalorama hospital, Washington, D. C., Dec. 1, 1862, with small-pox, and was returned to duty Feb. 17, 1863; Douglas hospital, Washington, D. C., June 14, with diarrhœa, and was transferred to Philadelphia next day.] He was much debilitated and had severe diarrhœa which continued throughout the case. On July 4 there was swelling of the right parotid gland and on the 6th constant vomiting. He died on the 14th. Astringents, quinine and iron, turpentine, beef-tea, wine and milk-punch were prescribed. *Post-mortem* examination: Body much emaciated; skin marked with variolous scars. The bronchial mucous membrane was inflamed; the left lung was covered with a thin pseudo-membrane stained with blood, the surface laterally, posteriorly and at the base was darkly ecchymosed and there was a large clot with a quart of bloody serum in the pleura, but no rupture of the lung. There were four ounces of liquid in the pericardium and white fibrinous clots in the cavities of the heart. The spleen contained three soft tubercular masses the size of hickory nuts. The mesenteric glands were somewhat

enlarged and many of them blackened. Four intussusceptions were found in the ileum, the mucous membrane of which showed irregularly diffused inflammation with black deposits; the solitary glands were somewhat congested; Peyer's patches were healthy.—*Satterlee Hospital, Philadelphia, Pa.*

Case 259.—Private George Stone, Co. F, 73d Ohio; age 20; admitted June 15, 1863, with phthisis and typhoid fever. Died July 25. *Post-mortem* examination eleven hours after death: Emaciation. Brain forty-eight ounces, soft; lateral ventricles filled with effusion. Mucous membrane of trachea easily torn, slightly discolored, delicate purple at its lower portion; tube containing tough, tenacious sputa; lymphatic glands at bifurcation healthy. Mucous lining of œsophagus pale and extensively eroded, especially below. Right lung eight ounces, uniformly pale, lower lobe slightly injected; left lung seven ounces and a half, lower lobe slightly injected and containing a consolidation about the size of a horse-chestnut, with a central cavity as large as a hazel-nut; walls of cavity well defined and enclosing a secretion similar to that found in the trachea. Pericardium large and containing twelve drachms of pale, limpid, straw-colored liquid; a small fibrinous clot in the right ventricle. Liver firm, of a dark-purple color externally and showing portal engorgement on section; spleen four ounces and a half, firm and of a dark mulberry color; omentum crowded up under lower edge of liver, well supplied with adipose tissue. Upper part of the small intestine congested, lower portion empty and much congested; Peyer's patches perfectly healthy; large intestine normal and filled with healthy fæces. Kidneys firm and congested internally, a blackish blood exuding on section.—*Ass't Surg. H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 260.—Private George H. Grover, Co. C, 7th Me.; admitted Aug. 10, 1863; typhoid fever. Died 21st. *Post-mortem* examination: Body much emaciated; apparently about 20 years of age; skin of trunk minutely ecchymosed. The lungs, heart, stomach and spleen were healthy; the liver was bright colored and exhibited distinctly the outlines of its acini. The mucous membrane of the lower part of the jejunum and of the ileum was inflamed, the inflammation being most intense in the lower part of the latter; the solitary and agminated glands appeared healthy and contained no deposit of black pigment; the ascending and descending portions of the colon were moderately inflamed but not ulcerated.—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 261.—Private W. C. Swails, Co. I, 49th Pa.; admitted Aug. 10, 1862; typhoid fever. Died September 8. *Post-mortem* examination next day: Age about 40 years; body extremely emaciated; skin ecchymosed. Lungs filled with bloody liquid; heart presenting an opaque-white membranous spot on the surface of the right ventricle and containing a large white clot in the right and a soft black clot with liquid blood in the left ventricle. Stomach presenting three large inflamed patches; its cul-de-sac softened. Liver dull-brown in color but otherwise natural; kidneys healthy. Ileum inflamed in patches; its glands not diseased; mesenteric glands opaque, cream-colored and somewhat enlarged; large intestine diffusely inflamed in the colon, particularly in the cæcum and sigmoid flexure, and extending into the rectum along its rugæ.—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

(b.) Peyer's patches not ulcerated.

Case 262.—Private Thomas Ward, Co. D, 42d N. Y.; age 30; was admitted Sept. 20, 1862, with a shell wound of the right cheek and typhoid fever. He died November 17. *Post-mortem* examination ten hours after death: Great emaciation. Lungs and pleuræ healthy; pericardium distended with serum; heart paler than natural. Liver, spleen and kidneys healthy. Mucous membrane of stomach pale, softened and with spots of extravasated blood; of ileum injected but not softened and Peyer's patches not ulcerated; of colon and rectum greatly injected, thickened, but neither softened nor ulcerated.—*Ass't Surg. C. H. Andrus, 128th N. Y., Stewart's Mansion Hospital, Baltimore, Md.*

Case 263.—Corp'l Daniel Landis, Co. C, 212th Pa.; age 22; admitted Oct. 21, 1864. Diagnosis—typhoid fever. Died November 2. *Post-mortem* examination twenty hours after death: Marked rigor mortis; some emaciation; bedsores; two very large abscesses under each ear. Lower lobe of right lung hepatized posteriorly. Heart, liver, pancreas and kidneys normal; gall-bladder containing two ounces of bile; spleen enlarged, black, softened; mucous coat of small and large intestines much congested but no thickening or ulceration of Peyer's patches or the solitary follicles. The reporter, Dr. Thomas Bowen, says that, in view of the diagnosis being typhoid fever, a very careful examination of the small intestine was made.—*Second Division Hospital, Alexandria, Va.*

(c.) Peyer's patches prominent, conspicuous, enlarged, thickened, etc.

Case 264.—Private Henry Clay, Co. I, 179th N. Y., was admitted May 11, 1865, much emaciated, very weak and unable to speak; his teeth and gums covered with sordes; pulse thready and irregular; respiration labored. He was washed with tepid water and whiskey, and treated with stimulants and nutritives, turpentine, quinine and opiate enemata. He died on the 19th. *Post-mortem* examination: Emaciation extreme. Membranes of brain anæmic. Lower lobe of left lung congested; heart containing a few small coagula; blood generally diffluent. Liver of normal size, showing fat-cells under the microscope; spleen large, soft. Ileum and cæcum much congested and inflamed, in a few places ulcerated; Peyer's patches quite prominent by a soft, friable deposit; mesenteric glands large, filled with similar deposits. Kidneys congested, somewhat fatty; urine albuminous.—*Augur Hospital, Alexandria, Va.*

Case 265.—Private William Plomb, Co. I, 4th N. J.; admitted Aug. 9, 1862; typhoid fever. Died 10th. *Post-mortem* examination next day. Body well formed and robust. The lungs were healthy; the heart flabby but otherwise normal. The liver, stomach, pancreas, spleen and kidneys were healthy. The ileum was deeply reddened, and the agminated and solitary glands more than ordinarily conspicuous, but without apparent disease; the colon was slate-colored, with patches of redness, and presented a number of scattered ulcers about the size of peas.—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 266.—Private Eugene Mason, Co. G, 157th N. Y.; age 16; admitted Sept. 19, 1864; typhoid fever. Died October 3. *Post-mortem* examination eighteen hours after death: Slight rigor mortis; much emaciation. Brain fifty-

six ounces. Right lung nine ounces, somewhat compressed and adhering firmly to the thoracic wall; left lung seven ounces; heart six ounces and a half, containing fibrinous clots in right and black clots in left cavities. Liver forty ounces, normal; spleen three ounces and a half, firm. Small intestine congested, some of its solitary follicles ulcerated and Peyer's patches thickened; large intestine studded with small ulcers a quarter of an inch in diameter. Kidneys normal.—*Act. Ass't Surg. H. M. Dean, Lincoln Hospital, Washington, D. C.*

Case 267.—Serg't K. A. Babcock, Co. H, 27th Mich., was admitted Aug. 12, 1863, having been suffering for six weeks from fever and diarrhœa. Under opium, camphor, blue-pill and subsequently quinine, aromatic sulphuric acid and morphine, he improved until the 20th, when the diarrhœa became profuse, and was followed by prostration and delirium which terminated in death on the 25th. *Post-mortem* examination: Heart flabby, pale; spleen enlarged, softened; mesenteric glands enlarged; elliptical patches near the ileo-cæcal valve hypertrophied but not ulcerated. —*Act. Ass't Surgs. C. T. Simpson and J. F. White, West End Hospital, Cincinnati, Ohio.*

Case 268.—Private Jacob Walder, Co. E, 2d Mass. Cav., was admitted Sept. 27, 1864, in a semi-conscious condition; pulse 90 and feeble, tongue brown and slightly cracked, bowels constipated, right iliac region tender and urine retained. Three pints of urine were withdrawn by catheter, and oil of turpentine and milk-punch were ordered. On the 29th his urine passed involuntarily, his condition otherwise remaining the same. On October 5 the tympanites had subsided and the tongue was cleaning. The turpentine was omitted, and as the bowels continued constipated an enema was given. On the 12th the patient fell into a state of almost complete stupor. As there was much difficulty in swallowing, beef-essence and whiskey were administered per rectum. He died on the 17th. *Post-mortem* examination twelve hours after death: Body much emaciated. A tumor about the size of an orange was found between the posterior portions of the cerebral hemispheres; it was quite firm and cut like soft cartilage. [*Specimen* 535, Med. Sect., Army Medical Museum.] The lungs were congested; the heart, liver and kidneys healthy; the spleen and glands of Peyer enlarged.—*Act. Ass't Surg. W. S. Adams, Hospital, Frederick, Md.*

Case 269.—Musician John Hummel, 4th N. Y. Cav.; age 29; was admitted June 28, 1863, having suffered for an unknown time with typhoid fever. He appeared to be doing well until July 7, when he began to sink, and died next day. *Post-mortem* examination nine hours after death: Spleen greatly enlarged; glands of Brünner, Peyer and of the mesentery enlarged; mucous and muscular coats of small intestine ulcerated throughout their whole length.—*Act. Ass't Surg. A. P. Crafts, Third Division Hospital, Alexandria, Va.*

Case 270.—Private Leonard Snell, Co. C, 2d N. Y. Cav.; age 27; was admitted Nov. 29, 1862, with enteric fever: Hot skin, frequent feeble pulse, dry tongue, coated with dark fur, dry cough and severe dyspnœa, delirium, slight diarrhœa, tympanitic distention of bowels and dulness on percussion over the lower lobe of the right lung. He died December 1. *Post-mortem* examination: The lower lobe of the left lung was hepatized; the upper portion of the left lung and the lower lobe of the right lung were congested; the heart, liver and spleen were normal. The small intestine was injected and the glands of Peyer enlarged.—*Third Division Hospital, Alexandria, Va.*

Case 271.—Private Jefferson Perkins, Co. F, 3d Ky. Cav.; age 21; was admitted Feb. 22, 1864, with typhoid fever. His case progressed favorably till one day, after sitting on the close-stool for a long time, he grew worse, failed rapidly, and died March 6. *Post-mortem* examination twenty-three hours after death: Lungs healthy; right cavities of heart containing a large clot which extended into the great vessels; liver somewhat pale; Peyer's patches enlarged.—*Hospital No. 8, Nashville, Tenn.*

Case 272.—Private Benjamin Ostrander, Co. H, 91st N. Y.; admitted May 6, 1865. Diagnosis—typhoid fever. Died 11th. *Post-mortem* examination fourteen hours after death: Lungs and heart normal; liver enlarged and softened; ileum congested; Peyer's patches much enlarged.—*Sixth Army Corps Field Hospital, Army of Potomac.*

Case 273.—Private James Roberts, Co. B, 67th Ohio; admitted Oct. 27, 1862; typhoid fever. Died Jan. 27, 1863. *Post-mortem* examination: Age about 22; no emaciation; a purplish color from gravitation of blood into the skin of the occiput; a number of reddish spots on the front of the abdomen and chest. Lungs and heart healthy. Spleen enlarged and flabby; liver healthy. Ileum presenting diffused redness with a few ecchymosed spots; lower agminated glands moderately enlarged, upper glands healthy; lowest solitary glands enlarged and in a few instances slightly ulcerated on the summit; large intestine with a grayish aspect of the mucous membrane accompanied with a few inflamed streaks. [*Specimens* 102–5, Med. Sect., Army Medical Museum, from this case, show various degrees of enlargement and ulceration of the agminated glands, 105 being specially noteworthy as exhibiting an extensive sloughing patch.]—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

(d.) Peyer's patches reddened, congested or inflamed.

Case 274.—Private William Eckard, Co. E, 149th N. Y.; admitted Jan. 18, 1863; typhoid fever. About a week before his death, February 21, pneumonic symptoms were observed. *Post-mortem* examination: Body slightly emaciated; apparent age 20 years. The brain weighed fifty ounces and a half; it was light colored and of normal consistence. The right lung weighed nineteen ounces and three-quarters, the left seventeen ounces and three-quarters; on both melanic matter was conspicuously arranged in lines corresponding to the course of the ribs. The left lung contained a deposit of tubercle and there were several consolidated lobules in its upper lobe; similar lobules were observed scattered through the right lung; a few cretefied tubercles were found in both; the bronchial tubes of the left lung were intensely congested and contained purulent matter; several of the bronchial glands contained calcareous deposits. There was a white fibrinous clot in the right side of the heart extending into the pulmonary artery; in the left side a black clot from which a white fibrinous branch extended into the aorta. The liver weighed sixty-seven ounces; its acini were distinctly marked; the gall-bladder was empty. The spleen weighed six ounces

and a quarter: it was of a light brick-red color and very soft. The pancreas was good three ounces and a quarter; it was firm and of a light pinkish color. The kidneys and suprarenal capsules were normal. The mucous membrane of the stomach was very soft; that of the small intestine was generally softened, especially in the jejunum, where it had a velvety appearance; the ileum was thin, dotted in places and somewhat congested. Peyer's patches were reddened; the large intestine was slate-colored except in the rectum, where it was congested. The mesenteric and mesocolic glands were normal.—*Ass't Surg. George M. Mobley, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 275.—Private George P. Thomas, Co. ——, 14th ——; age 26; was admitted Feb. 2, 1863, with the eruption of measles well developed. In a few days the eruption had almost entirely disappeared; the symptoms of typhoid fever were manifested, and he died on the 14th. *Post-mortem examination.* The brain was normal. The lungs were congested posteriorly and presented subacute inflammation, the exhalation of which was evident from the great numbers of miliary tubercles filling the posterior and inferior portions of the lungs; the right lung weighed thirty-seven ounces. Clots were found in both sides of the heart. The liver and pancreas were normal, the spleen, six ounces, contained miliary tubercles; the kidneys were somewhat enlarged and lobulated, each weighing eight ounces. The stomach was contracted and its mucous membrane somewhat congested. In the lower small bowel points were observed, which were hard to the feel. Peyer's patches were generally raised and dark; about the middle of the ileum its mucous folds were deeply congested, and above these a long Peyer's patch, enlarged and reddened, was situated in the midst of another congested region; among the tubular ramifications surrounded by congestion was a patch a foot in length resembling a Peyer's patch in structure and enlarged as many such patches in the ileum. The transverse and descending portions of the colon were reddened; the rectum congested.—*Asst Surg. Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Case 276.—Private Phineas Wooster, Co. E, 179th N. Y.; age 18; admitted Jan. 31, 1863. Diagnosis—typhoid fever. The clinical history is meagre, consisting of only one entry, dated February 4: Pulse frequent, easily compressed; tongue dry, edges white; skin dry and harsh; night-sweats; bowels loose, stools thin and offensive. Treated by wine and porter with opiates at bedtime. He died on the 10th. *Post-mortem examination* twenty-eight hours after death: Body much emaciated. The brain was anæmic. The right lung weighed seventeen ounces and a quarter, its upper lobe congested posteriorly and its lower hepatized and containing small abscesses which communicated with the bronchial tubes; the left lung weighed eleven ounces. The pericardium adhered to the surface of the heart, on which were dark spots and exuded lymph; the heart was flabby and contained a few clots in both ventricles. The liver, forty-four ounces and a quarter, was flabby and light colored; the gall-bladder contained two ounces of thin green bile; the spleen was small and tough. The duodenum was much congested in its upper part, its mucous coat was slate-colored; the jejunum in its upper part was slate-colored without and highly congested within, and lower down the color of the serous membrane was darker, Peyer's patches more congested, the valvulæ softened and the coats of the ileum generally thinned and reddened; the ascending colon was slate-colored. The left kidney was slightly congested.—*Lincoln Hospital, Washington, D. C.*

Case 277.—Private M. W. Reese, Co. H, 42d Miss.; rebel; age 28; admitted Aug. 3, 1863: typhoid fever. Died 11th. *Post-mortem* examination: body rigid but emaciated. Brain healthy, lateral ventricles distended. Trachea pale above, purple and congested towards the bronchi; mucous membrane purple with dark purple patches in its upper third and white-colored below. Right lung eighteen ounces, much congested, several of the lobules of the upper lobe surrounded by a dark-reddish material resembling clotted blood; left lung seventeen ounces and a half, engorged with semi-solidified blood in the posterior part of its lower lobe. Heart pale, contains no clot. Liver sixty-four ounces, mottled light and dark purple externally, of pulpy pale internally; gall-bladder containing an ounce of bile; spleen fourteen ounces, dark but firm; pancreas four ounces, healthy. Intestines healthy except near the ileo-cæcal valve, where Peyer's patches seemed to be congested, but were not swollen nor ulcerated. Both kidneys were anæmic, with the pelves pale and the pyramidal bodies of a dark-purple color.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 278.—Sergt Alexander Beaty, Co. I, 69th N. Y.; age 22; was admitted Jan. 2, 1863, with gangrene of the toes following typhoid fever. The gangrenous condition was attributed to frost-bite while out on picket. Both feet were amputated through the metatarso-phalangeal articulation, the 2d January, 3 days after the operation delirium set in and continued, with occasional brief intervals, until death on the 10th. *Post-mortem examination* an hour and a half after death: No rigor mortis; skin sallow; in the sole of the right foot was an abscess with offensive grayish contents, and over the external malleolus of the left foot was another which communicated with the wound of operation; the cartilages exposed by the amputation were much eroded, and those of the cuboid and internal cuneiform bones were nearly destroyed. The subarachnoid space and the ventricles of the brain contained an unusual quantity of serum. The right lung weighed eleven ounces, the left nine and a quarter; in the upper lobe of the left lung were two small round masses of cheesy tubercle and in another the end of a bronchus, which contained offensive pus; a smaller, rather similar, abscess was found in the middle lobe of the right lung; the bronchial tubes contained a mucous exudation; the bronchial glands were dark-colored externally and contained a white calcareous deposit. The heart was flabby. The liver, one of firm consistence and mottled appearance, the spleen, sixteen ounces, was dark-colored, firm, and congested; the pancreas was of a right pale color and firm. Both kidneys were of firm consistence; in the lower part of the right kidney was a small cavity containing yellowish cheesy pus. The stomach was healthy; the jejunum mottly congested, the lower part of the ileum intensely congested. The solitary glands enlarged and reddened and Peyer's patches congested and somewhat prominent. There was a region of congestion in the ascending colon.—*Asst Surg. George M. Mobley, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 279.—Corp'l John Schaffner, Co. B, 14th Vet. Res. Corps; admitted March 28, 1864; typhoid fever. Died April 3. *Post-mortem* examination eighteen hours after death: Body much emaciated. The duodenum was congested; the jejunum slightly congested in patches; the ileum congested throughout: Peyer's patches congested but not ulcerated; there was one congested spot in the lower colon, which was otherwise healthy.—*Act. Ass't Surg. C. T. Trautman, Harewood Hospital, Washington, D. C.*

Case 280.—Private Conrad Hold, Co. D, 52d N. Y., was admitted Feb. 13, 1863, with fever and persistent vomiting. Epistaxis occurred on the 17th, and with the vomiting continued to the end, the bleeding usually recurring at night. The patient became stupid on the 21st, and there was some diarrhœa, which did not last beyond the 28th. Creasote, acetate of morphia and blisters had no effect on the vomiting. Medicine was discarded towards the end, stimulants and nourishment only being used. He lingered until March 7. *Post-mortem* examination: The glands of Peyer were congested and swollen and there were some signs of recent pericarditis. The spleen, liver, kidneys and lungs were normal.—*Act. Ass't Surg. John E. Smith, Douglas Hospital, Washington, D. C.*

Case 281.—Private Henry G. Howell, Co. I, 27th N. J., was admitted Feb. 15, 1863, in a prostrate and delirious condition. He had frequent fits of coughing and expectorated a viscid, transparent, frothy mucus. During the following night his face became purplish, his delirium increased, and a clammy perspiration bedewed his skin. He died next day. *Post-mortem* examination four hours after death: Body robust; apparent age 25 years. The brain weighed forty-six ounces and was soft and congested to redness. There were pleuritic adhesions on both sides; the right lung weighed forty ounces and a half, the left thirty-three ounces; the lower lobes of both lungs and portions of the upper lobes were in a state of red hepatization, approaching gray; the bronchial tubes were congested and in some instances plugged with a fibrinous deposit. The heart contained large fibrinous clots on both sides. The liver weighed twenty-eight ounces and a half, its acini were distinct; the spleen, four ounces and three-quarters, was light-colored and soft, with distinct trabeculæ; the right kidney weighed five ounces and a half, the left five and a quarter; the suprarenal capsules were small, dark and tough. The stomach was large and its fundus congested; the glands of the duodenum were slightly enlarged; the upper third of the jejunum was irregularly congested; the ileum was congested, its solitary glands enlarged and reddened and the patches of Peyer irregularly inflamed and thickened. The large intestine was distended with gas, the solitary glands swollen and reddened—twelve of these enlarged glands were counted in a square inch selected at random; the mesenteric glands were enlarged and inflamed.—*Ass't Surg. George M. McGill, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 282.—Private Henry Campbell, Co. H, 20th Mich., was admitted Jan. 24, 1863, with typhoid fever, and died February 2. *Post-mortem* examination sixty-eight hours after death: Body well developed and fat. The brain, forty ounces and a half, was of light color and firm consistence. The heart contained clots. The lungs were congested hypostatically; the left lung weighed eighteen ounces, the right twenty-four ounces. The liver weighed forty-five ounces; the spleen ten ounces; the kidneys seven ounces each; the pancreas two ounces and three-quarters; the gall-bladder was empty. The mucous membrane of the stomach was congested; a lumbricoid worm was found in the jejunum, which was irregularly congested; its lower part and the upper part of the ileum were much thinned; Peyer's patches were enlarged and inflamed, especially near the ileo-cæcal valve; the coats of the large intestine were very thin and the mucous membrane congested, especially in the upper portion of the colon.—*Ass't Surg. George M. McGill, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 283.—Private Martin Dusenbery, recruit, 9th Ohio Cav.; age 20; was admitted Oct. 14, 1863, with typhoid fever. He had been sick four or five days. His fever was slight, but there was some delirium and cough with mucous sputa; his bowels were open, and there was slight tenderness in the epigastric and right iliac regions. Next day the delirium had disappeared and he was otherwise better. On the 18th his tongue was more coated, bowels open, abdomen tender, cough aggravated and respiration hurried. During the night of the 19th he was actively delirious, requiring restraint; and next day there was severe pain in the right lung, with dulness and crepitant râles. He died on this day. *Post-mortem* examination three hours after death: Left lung congested; lower two-thirds of right lung hepatized, with pleuritic adhesions especially of the diaphragm, and twelve ounces of serum in the pleural cavity. Intestines congested; Peyer's patches enlarged and inflamed but not ulcerated.—*Dennison Hospital, Ohio.*

Case 284.—Private George W. Harvey, Co. H, 24th Maine; age 31; was admitted July 24, 1863. This patient was a deserter, and although rational on admission his mind was much exercised on the subject of his capture and probable punishment. This had an evident influence on the progress of his disease. Low delirium followed and continued until death on the 30th. *Post-mortem* examination: Heart, lungs and liver healthy; mesenteric glands and those of Brünner and Peyer extensively enlarged and inflamed; mucous coat of small intestine softened and ulcerated throughout its entire length.—*Act. Ass't Surg. A. P. Craft, Third Division Hospital, Alexandria, Va.*

Case 285.—Corp'l William H. Glattz, Co. K, 4th Del.; age 23; was admitted July 23, 1863, in an advanced stage of typhoid fever. He died on the 26th. *Post-mortem* examination: Lower lobe of right lung congested; Peyer's patches inflamed and elevated; mucous follicles of the colon much enlarged; spleen congested; liver and kidneys normal.—*Act. Ass't Surg. T. Turner, Third Division Hospital, Alexandria, Va.*

Case 286.—Private Peter A. Wayman, Co. B, 91st N. Y.; admitted May 6, 1865. Diagnosis—typhoid fever. Died on the 11th. *Post-mortem* examination sixty hours after death: Upper lobe of right lung hepatized and adherent; left lung and heart normal; spleen double the usual size; stomach healthy; Peyer's patches swollen and inflamed; colon normal.—*Sixth Army Corps Field Hospital, Army of Potomac.*

(e.) Peyer's patches pigmented.

Case 287.—Private William Sibley, Co. A, 2d Mass. Heavy Art.; age 25; was admitted Sept. 10, 1865, having,

from his own statement, been sick for a long time with fever and diarrhœa. He had a hot skin, dry and coated tongue and feeble intermittent pulse: he became delirious during the night, and died next day. *Post-mortem* examination ten hours after death: Not much emaciation: no rigor mortis. The subarachnoid space contained about two ounces of serum, and a small quantity was found in the ventricles: the pia mater was congested: ecchymosed spots were observed on the summit of the right cerebral hemisphere and on the right side of the floor of the fourth ventricle: the section of the hemispheres showed numerous puncta vasculosa. A large portion of the lower lobe of the left lung was in the first stage of pneumonia: the right lung was congested posteriorly and weighed twenty-two ounces, the left thirty-two ounces. The heart weighed twelve ounces: the auricular septum was perforated: there was a mixed clot in the right side, a little fluid blood in the left. The liver was firm, dark-colored and weighed fifty-eight and a quarter ounces: the gall-bladder contained a small quantity of thin brown bile: the spleen was soft and weighed six ounces. The stomach was thin and discolored; the ileum congested in regions, its solitary glands enlarged and Peyer's patches prominent and speckled with blood: the large intestine flaccid and in part discolored. The kidneys were large and soft.—*Ass't Surg. George M. McGill, U. S. A., Hick's Hospital, Baltimore, Md.*

Case 288.—Private Henry H. Joyce, Co. B, 6th Va. (rebel) Inf.; admitted Aug. 3, 1863: typhoid fever. Died 7th. *Post-mortem* examination sixteen hours after death: Body not emaciated: rigor mortis slight: apparent age 23. The brain was firm and weighed forty-eight ounces; the pia mater was congested over the posterior portion of both hemispheres. The mucous membrane of the trachea was congested, the congestion extending into the bronchial tubes: the lymphatic glands at the bifurcation of the trachea were firm and black. There were pleuritic adhesions on both sides; the right lung weighed nineteen ounces, its upper lobe slightly congested and a frothy secretion exuding on pressure, its middle lobe congested hypostatically and having on its surface numerous spots of transuded blood; the left lung weighed twenty ounces, its upper lobe normal, but the lower ecchymosed and greatly congested. The right auricle of the heart contained a thin fibrinous clot which extended into the ventricle and thence into the pulmonary artery and its branches for a distance of three or four inches; the endocardium in the right auricle was purplish. The liver was somewhat congested and rather flabby; the gall-bladder contained half a drachm of thick bile; the spleen, nineteen ounces, was firm and of a rich mahogany color; both kidneys were moderately firm, the surface somewhat greenish, the cortical substance pale except at the superior extremities of the organs, where it was congested, the pyramidal bodies purplish; the pancreas, three ounces, was purplish and of normal firmness. The mucous membrane of the fundus of the stomach was dark-colored, in the rest of the organ it was pale. The small intestine presented nothing remarkable except a dark-purplish congestion in the lower third of the ileum: Peyer's patches were pale with conspicuous black spots in their follicles, but nowhere were they thickened or ulcerated. The large intestine was healthy.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 289.—Private Jacob Henson, Co. G, 16th Pa. Cav.: age 18: was admitted March 25, 1864, very weak and much emaciated, with a frequent and feeble pulse and hurried respiration. He was quite deaf; he had a bed-sore two inches square, with highly inflamed margins, over the lower part of the sacrum: his right knee-joint was acutely inflamed, quite red over the internal condyle, very hot and exquisitely painful. From the testimony of a comrade it was learned that the patient had been affected with erysipelas and typhoid fever, and that the inflammation of the knee-joint occurred as a sequel to these diseases. Cold water was applied to the knee and extension kept up by Gurdon Buck's apparatus with a three-pound weight. Opium and whiskey were administered. Next day the condition of the knee-joint was improved: but the patient's eyes were yellow, his skin purpuric and dry and his face flushed: he had pain in the left side with some dulness, bronchial respiration and increased vocal resonance, a hacking cough but no expectoration; he had also some diarrhœa. On the 28th he had a severe chill, which recurred next day and was followed by profuse perspiration. After this, although there was manifest improvement in the condition of the knee-joint and lung, his strength failed gradually, and he died on April 7. *Post-mortem* examination fourteen hours after death: Body much emaciated; skin dingy with many purpuric spots; rigor mortis well marked. The brain was healthy. The right lung was healthy but firmly adherent on all sides: the left pleural cavity contained two pints of serum: the lower lobe of the left lung was covered with fibrin, at one point nearly half an inch thick, and in its lower and posterior part was an abscess the size of a large walnut surrounded by much solidified tissue. The pericardium contained two ounces of serum. The liver, seventy-one ounces, was firm and waxy and had pale spots scattered over its surface; the gall-bladder was empty; the pancreas, spleen and kidneys were healthy. The solitary and agminated glands of the intestines were prominent and dotted with dark points. The knee-joint contained two ounces of pus mixed with fibrinous flakes, one of which was over an inch and a half in diameter: the cartilage on the lateral aspects of the femoral articulating surface was destroyed, leaving bare the cancellous structure of the bone; the synovial membrane was vascular, especially above the patella, where also it was covered with shreds of fibrin; the bursa beneath the extensor tendon of the thigh communicated with the joint by several orifices and was filled with pus and lymph.—*Lincoln Hospital, Washington, D. C.*

Case 290.—Private Daniel Crum, Co. C, 61st N. Y.; admitted July 26, 1862: typhoid fever. Died August 24. *Post-mortem* examination next day: Organs generally healthy except that the agminated and solitary glands were thickened and of a most remarkable black color, resembling the bluish-black marks of tattooing: the surrounding parts of the mucous membrane were pale and devoid of anything like congestion.—*Asst. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 291.—Private Thomas J. Crumb, Co. D, 44th N. Y.: admitted Aug. 10, 1862: typhoid fever. The patient had diarrhœa on admission, and during the last few days of life was delirious. Died 27th. *Post-mortem* examination next day: Body much emaciated; age about 25 years. Brain natural in appearance except that the pia mater was unusually bloodless, opaque and wrinkled. Heart small, contracted, without a vestige of adipose tissue,

liquid blood in its right side, the left empty except a small coagulum of fibrin attached to the chordæ tendineæ. Lungs healthy. Liver small, dusky-purple above and slate-colored below; spleen small, in section dull-brown. Stomach and intestines distended with air and presenting no evidence of inflammation; agminated glands healthy except that they contained a deposit of black matter; solitary glands unusually prominent and containing black matter; mucous membrane of the colon cream-colored, remarkably bloodless, solitary glands barely perceptible.—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 292.—Private Thomas Rose, Co. A, 49th Pa.; admitted Aug. 10, 1862; typhoid fever. Died September 23d. *Post-mortem* examination: Age about 20; body considerably emaciated and everywhere ecchymosed. Lungs and heart healthy, the latter containing a white clot in the right ventricle extending into the pulmonary artery, another in the left auricle and a third in the commencement of the aorta. Spleen, liver, kidneys, suprarenal bodies and pancreas natural. Mucous membrane of stomach inflamed more or less diffusely and with occasional small patches of greater intensity. Ileum inflamed in patches, increasing in intensity towards the lower end; solitary glands enlarged, inflamed and containing black matter; agminated glands with black deposit but otherwise apparently healthy. Colon distended with air, except descending portion, which was narrowly contracted but not inflamed; cæcum, ascending and transverse colon inflamed; solitary glands conspicuous and containing black pigment.—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 293.—Private A. W. Parris, Co. H, 2d Vt.; admitted Aug. 10, 1862; typhoid fever. Died 26th. *Post-mortem* examination next day: Body large, somewhat wasted, aged about 30 years; skin bronzed and upon the trunk somewhat ecchymosed. Heart normal, containing a fibrinous clot and much liquid blood. Lungs, liver and spleen healthy. Stomach distended with air and liquid, its mucous membrane dusky-gray and with an inflamed patch near the pylorus. Ileum highly inflamed in patches; agminated glands, thirty-six in number, all dotted with black pigment but otherwise natural; solitary glands inconspicuous. Colon contracted, gray, with a few small red patches, and with black pigment in the solitary glands.—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 294.—Private James B. Hendricks, Co. F, 49th Pa.; admitted Aug. 10, 1862; typhoid fever. Died 14th. *Post-mortem* examination: The organs of the chest and abdomen appeared to be healthy except the ileum and colon, in both of which the mucous membrane was inflamed. The agminated and solitary glands contained points of black pigment, but otherwise seemed natural.—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 295.—Private Joseph Robbins, Co. H, 49th Pa.; admitted Aug. 10, 1862; typhoid fever. Died 14th. *Post-mortem* examination next day: The body was much emaciated; the skin of the trunk in some places appeared as if ecchymosed. The heart, lungs, liver, stomach, spleen, pancreas and kidneys were healthy. The mucous membrane of the ileum was inflamed throughout, but near the lower end, for about ten inches, the inflammation was most aggravated and had attached small but numerous shreds of opaque-white pseudo-membranous matter, which under the microscope was found to consist of a fibro-granular matrix and granular corpuscles resembling ordinary pus corpuscles; the solitary glands were invisible or absent, except a few scattered here and there in the jejunum; the agminated glands were conspicuous, dotted with black pigment, but not perceptibly diseased. The colon was exceedingly contracted; within the cæcum and ascending colon the mucous membrane was red and the solitary glands large and conspicuous by the presence of black pigment; the lower two-thirds of the colon presented a mingled red and slate-color, with many small ulcers apparently resulting from the destruction of the solitary glands.—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 296.—Private Thomas Elder, Co. D, 14th U. S. Inf.; age 18; was admitted Aug. 10, 1862, with typhoid fever, and died on the 18th. *Post-mortem* examination next day: Body not much wasted. Heart and inner surface of pericardial sac roughened with old pseudo-membranes; right lung engorged. Liver large; gall-bladder nearly empty; mucous membrane of stomach presenting a large reddened patch on the lower part of its cardiac extremity: spleen showing an inflamed condensation of its tissue about the size of a nutmeg at its upper end, with the omentum in contact also inflamed. The mucous membrane of the ileum was inflamed in regions, one of which was two feet long and stopped about six inches from the ileo-colic valve. There were thirty-two agminated glands ranging from half an inch to three inches in length; a large patch on each fold of the ileo-colic valve was dotted with black pigment, but appeared otherwise healthy; the next gland above also appeared healthy; the others, except the first two, were much thickened, opaque and white, or thickened and reddened by inflammation, but none were ulcerated; the solitary glands generally were invisible in the jejunum and were few in the ileum, but where obvious in the latter, they were quite prominent and red. The colon was much contracted; its mucous membrane was of a slate-color mingled with small patches of inflammation, and the solitary glands were black. [*Specimens* 228 to 231, Med. Sect., Army Medical Museum, are from this case.]—*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 297.—Private Daniel Eaton, Co. H, 3d N. J. Cav.; age 20; was admitted April 29, 1865: Pulse 150; tongue dry, brown and glazed; teeth and lips covered with sordes; pupils considerably dilated; mouth, nose, cheeks and hands stained with blood; respiration frequent and deglutition difficult. He moaned constantly and lay in a state of low muttering delirium, from which he could be partly aroused, but was unable to articulate; there were frequent slight convulsive movements of the body somewhat like those produced by moderate shocks of an electric battery; his urine was passed involuntarily and there was a very offensive ammoniacal odor about his person. He died May 1. *Post-mortem* examination five hours after death: Body but little emaciated. The vessels of the pia mater were engorged. The upper lobe of the left lung was hepatized, and hepatized patches were found here and there through both lungs; the rest of the lung-tissue was congested. The pericardium contained about an ounce and a half of serum. The spleen was enlarged. Peyer's glands were enlarged but not ulcerated; slate-colored patches, having a peculiar punctated appearance, were scattered here and there in the lower portion of the ileum and in the colon in the vicinity of the ileo-cæcal valve.—*Act. Ass't Surg. G. Ellis Porter, Cumberland Hospital, Md.*

Heliotypé. *James R. Osgood & Co., Boston.*

CICATRICES OF ULCERATED PEYER'S PATCHES

No 490. MEDICAL SECTION.

(f.) Peyer's patches cicatrized.

Case 298.—Recruit Joseph Hughes, 7th N. Y. Cav.; age 16; was admitted Jan. 31, 1865, with phthisis consecutive to camp fever. He had been sick five months. He complained of palpitation of the heart and pain in the left breast just below the nipple, with cough and slight expectoration. Sinapisms were applied to the chest and brown mixture prescribed, with Dover's powder at night. Stimulants seemed to aggravate the chest symptoms. He died February 8. *Post-mortem* examination: The brain was quite firm. The right lung was small and had a few tubercles at the apex; in the left there were numerous vomicæ. The abdominal cavity contained a quantity of serum rendered turbid with curdy flakes of lymph; the viscera were coated with soft white lymph. The mucous membrane of the ileum was of a grayish-slate color, its villi were hypertrophied and at the apex of each was a deposit of black pigment; Peyer's patches, which had been ulcerated away, were in every stage of cicatrization, the ulcers being smooth and the gut around them puckered. [See *specimens* 489–491, Med. Sect., Army Medical Museum, and the plate facing this page.] The colon was cream-colored, its solitary follicles black and with minute central depressions.—*Act. Ass't Surg. W. C. Minor, Third Division Hospital, Alexandria, Va.*

Overlooking for the present the eighty-eight cases in which the patches of Peyer were said to have been ulcerated as indicating the presence of the typhoid poison, and the forty-one cases of ulceration of the ileum or small intestine as failing to exclude the possibility of typhoid from a want of precision in the language used, attention is invited to a brief consideration of the intestinal lesions in the remaining fifty-three cases: In eleven of these, 246–256, the condition of Peyer's patches was not stated, and the intestine is said to have been congested or inflamed but not ulcerated, and in forty-two, cases 257–298, various conditions of the patches, not, however, including ulceration, were reported, and the intestines also were found to be generally free from ulceration.

Case 253, one of the eleven, may be set aside as implying in the disorganization of the intestine a possibility of typhoid sloughing of the closed glands. The history in seven of the cases, 249–252 and 254–256, shows that the patients lived long enough for notable changes to have taken place in the agminated glands had typhoid fever been really present; but the records refer only to a congestion of the intestines; in 252 the solitary glands were enlarged and in 254 their apices were ulcerated, but the agminated glands were unaffected; in 249 there was no typhoid lesion, but whether the changes in the spleen, which caused the fatal peritonitis, were malarial or not is uncertain. In one other case, 248, time was afforded before death for the development of typhoid ulceration of the glands had the typhoid poison been the primary cause of the fatal sickness, for the patient lived long enough to present extensive ulcerations of the larynx and trachea. In two cases the duration of the sickness is unknown; but in one of these, 246, the condition of the ileum is expressed in language that admits of no doubt of the absence of typhoid, and as in the other case, 247, the *post-mortem* appearances indicated typhus or a malarial fever, the inference is that the disease was malarial.

Of the forty-two cases presenting various conditions of the agminated glands, not, however, including ulceration, the glands were *normal, healthy* or *not diseased* in *five* cases, 257–261. In the first of these the patient was only five days in hospital when death occurred with symptoms of cerebral implication which, if not due to a malarial cause, was certainly not owing to typhoid fever. A tumefaction of the glands of Peyer has, since the time of Louis, been regarded as the initial and essential lesion of this fever; but in the case in question these glands were healthy while the brain presented signs of inflammation. In the four other cases there was ample time afforded before death for well-developed ulceration of the patches, but a congestion of the lining membrane was the only morbid intestinal appearance, and in 259 this was mainly found in the upper portion of the small intestine.

In *two* of the forty-two cases the patches were reported as *not ulcerated*, and in both the patients were in hospital long enough to permit of the occurrence of well-marked changes

if typhoid fever had been the cause of their sickness. In one of these, case 263, it is recorded that, in view of the diagnosis, special attention had been paid to the *post-mortem* condition of the small intestine.

In accordance with pathological doctrines which are generally accepted, the prominent condition of the patches in the *ten* cases, 264–273, must be regarded as indicating the presence of enteric fever at the time of death. But since the fatal illness in most of these cases lasted long enough for sloughing of the patches to have taken place had it been typhoid fever from its inception, some morbid cause must have been in operation before the influence of the typhoid poison was manifested; and there is nothing in the *post-mortem* lesions to contraindicate, but on the contrary much to sustain the opinion, derived from clinical observation in other and concurrent cases, that this antecedent disease was an active malarial affection. These cases may therefore be viewed as truly typho-malarial, the typhoid affection supervening on the malarial attack.

Of the *thirteen* cases, 274–286, in which the vascular supply of the patches had undergone notable changes, these were associated with tumefaction in seven cases, 275, 279, 281–284 and 286, in most of which the short period elapsing before the fatal issue suggests death from typhoid fever in advance of the period when sloughing usually takes place. It may be remarked, however, that if tumefaction and congestion of the patches are ever developed, in the absence of enteric fever, as a consequence of morbid vascular action affecting the intestinal canal as a whole,* the claims of some of these cases, to wit: 275 and 279, as illustrative of this condition might be entitled to consideration. Two of the thirteen cases, 280 and 285, may be regarded as truly typho-malarial, since they presented the glands swollen but entire at a period when in pure typhoid the eliminative process would have been in operation. In 277 there was no tumefaction of the agminated glands, although the patient was eight days in hospital and sick for probably a longer time. In 274 and 276, in which the fever lasted long enough for the establishment of the ulcerative process if a typhoid element had been present, the plaques were altered only in so far as they participated in a general and long continued congestion of the intestinal membrane. Lastly, in 278, which ended fatally at a late period, the patches were not ulcerated but only congested and somewhat prominent in an intestine which was darkly injected throughout.

In *twelve* of the forty-two cases, 287–298, the intestinal lining was pigmented, but the agminated glands were not ulcerated. In the first of these there was neither ulceration nor sloughing, although the patient was sick for a long time; the ileum was congested in regions, its patches prominent and speckled with blood and its solitary follicles conspicuous. In the eight cases, 288–295, the solitary and agminated glands were dotted with black pigment, and in most of these there was ample time before death for ulceration of the patches to have taken place, for even in 295, which had been only five days in hospital, the patient had lived long enough for the development of ulceration in the solitary follicles; nevertheless the agminated glands were intact but for the pigmentary deposit. But in the remaining three cases, 296–298, an enteric element was superadded to the pigmented condition; in 296 certain of Peyer's glands were thickened, opaque and white or reddened by congestion; in 297 they were enlarged, and in 298 the ulcerated glands had become cicatrized.

In summing up the analytical results briefly enumerated in the above paragraphs it is found that, of fifty-three cases characterized by so many of the so-called typhoid symptoms

* See *infra*, page 456.

that the attending medical officers formed a diagnosis of typhoid fever, no less than thirty failed to present at the post-mortem examination those anatomical changes which from the time of Louis have been generally regarded as pathognomonic of the disease; but showed, on the contrary, a series of lesions in perfect harmony with our knowledge of the frequently occurring but not essential incidence of the malarial poison on the intestinal canal. It is submitted that these cases fully sustain the statement that among those reported as typhoid fever were many which were purely and simply malarial fevers; and since similar cases have been presented from the typho-malarial records, and even from those of the paroxysmal fevers, the conclusion that typhoid symptoms were not necessarily associated with a specific enteric poison must be admitted.

The post-mortem records contain also a series of seventy-nine cases variously reported at first, but from their later symptoms or necroscopic appearances afterwards regarded as typhoid fever. These are of interest as showing the relations of typhoid to various other diseases. These cases, 201, 247 and 366, admitted by the attending medical officers as malarial fevers, should have been presented in a previous part of this section; but their absence from the series of cases reported as typho-malarial does not alter the conclusions that have been derived from an investigation of that series, while in their present connection they serve as brackets for the typho-malarial cases, each illustrative or typical of its kind: 201 as representing true typho-malarial fever—typhoid modified by malarial complications: 247 as representing malarial fever with typhoid symptoms, the record of which fails to show whether the intestinal ulceration was due to the malarial or the typhoid element,—such cases have in this report been set aside as probably typhoid; and 366 as illustrating paroxysmal fever with typhoid symptoms, but with no *post-mortem* lesion to indicate the presence of a specific enteric poison.

These seventy-nine cases have been arranged in accordance with the anatomical changes in the intestinal canal.

(A.) Peyer's patches ulcerated—42 cases.

Case 200.—Private George H. Rimer, Co. I, 24th N. Y. Cav.; age 16; was admitted June 24, 1864, with a gunshot flesh wound of the left leg. On July 2 signs of congestion of the brain made their appearance: the pupils were unequally dilated, the right being larger than the left; the head was hot and with the chest was covered with a copious perspiration: the fæces and urine were passed involuntarily; articulation was indistinct. He died on the 4th. Post-mortem examination thirty hours after death: The body was somewhat emaciated. The brain weighed sixty ounces: its blood-vessels were much injected, and the liquid in the ventricles and subarachnoid spaces was increased in quantity. The lungs were slightly adherent at their apices by recent lymph; the right weighed nineteen and a half, the left thirteen ounces; the lobes of the left lung were interadherent and the posterior part of the lower lobe was hepatized. The heart weighed seven ounces and a half, the liver fifty-nine ounces, and the spleen nineteen ounces and a half. The stomach was normal. Many of Peyer's patches were extensively ulcerated, the solitary glands were much enlarged; the large intestine was congested and in its lower portion ulcerated.—*Act. Ass't Surg. H. M. Dean, Lincoln Hospital, Washington, D. C.*

Case 201.—Private John Rice, Co. F, 10th Vt.; age 23; was admitted from field hospital at Sandy Hook, Aug. 17, [illegible] with diarrhœa. Diagnosis and treatment: complaining of exquisite pain in the abdomen and having frequent mucous discharges from the bowels. Hoffmann's anodyne was prescribed and a large poultice applied over the abdomen. On August 20 he was transferred to Lincoln Hospital, where continued on the 31st: on this day the discharges were controlled by enemata containing lead and opium. September 1 the symptoms were more favorable, the skin less harsh and [illegible] and tongue moist and clean; but there were occasional recurrences of febrile action. Quinine and citrate of iron and quinine were given, with opiate enemata and woolen packing to the abdomen instead of the poultice; turpentine was also administered. The patient's appetite was good, but he remained very weak and the tongue continued coated dry. Towards the end of September the febrile symptoms returned, assuming the [illegible] type, and the diarrhœa continued. On October 3 the patient became dull and was aroused with difficulty; the discharges were passed involuntarily and were mixed with blood and pus; bed-sores appeared on the hips. Wine and stimulants were freely given, but the patient grew worse rapidly and died on the 11th. *Post-mortem* inspection revealed ulceration of the large intestine extensively thickened, its calibre diminished and its mucous tissue

destroyed in patches by ulceration; these patches were most numerous in the sigmoid flexure, where perforation had taken place, the orifice being two-thirds of an inch in diameter. The mucous coat of the ileum was eroded and the agminated and solitary glands ulcerated; the jejunum was inflamed in patches. [See *specimens* 459 and 460, Med. Sect., Army Medical Museum, and plate facing this page.]—*Ass't Surg. C. Bacon, jr., U. S. A., Annapolis Hospital, Md.*

(b.) Diagnosis: Remittent fever.

CASE 301.—Private Jesse Steiner, Co. D, 167th Pa.; age 30; was admitted July 12, 1863, with debility and remittent fever, and died on the 21st. *Post-mortem* examination twelve hours after death: Body well developed; rigor mortis well marked. The brain-substance was firm and slightly congested; half a drachm of bloody fluid was found in the lateral ventricles. The trachea was discolored and filled with viscid, dark-brown sputa; its mucous membrane was rather soft and the lymphatic glands at its bifurcation were enlarged, blackened and softened, except in the centre, where there was a calcareous degeneration. The œsophagus was pale and rather contracted; numerous dark-colored spots were found at the lower portion, one of which was the seat of superficial ulceration. The right lung weighed twenty ounces; its upper lobe was covered with fibrinous adhesions; this lobe and the lower lobe were slightly congested, but the middle lobe was healthy; the bronchial tubes were filled with a secretion similar to that found in the trachea. The left lung weighed twenty-three ounces and was somewhat congested at its apex and of a dark-purple color from venous engorgement in its lower lobe. The heart contained a very small clot in the right ventricle. The liver was of a delicate purplish hue externally, its acini pale, capsule readily torn and parenchyma firm; the spleen was mulberry-purple and moderately firm. The small intestine was perfectly healthy to within a few inches of the ileo-cæcal valve, where several Peyer's patches were ulcerated. Numerous ecchymosed spots were found in the upper portion of the large intestine; the lower third contained an immense quantity of unripe blackberry seeds, and its mucous membrane, purple in color and rather firm, was lined with an extensive black clot.—*Ass't Surg. H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

(c.) Diagnosis: Gastritis.

CASE 302.—Private Lorenzo Weakley, Co. C, 7th Va.; age 19; was admitted Aug. 21, 1864, his previous history being unknown. He was emaciated and exhausted from epigastric pain and incessant vomiting, his food and drink being almost instantly rejected; he had a slight diarrhœa; his pulse was feeble and his tongue covered with a gray moist coating. The vomiting and diarrhœa continued until the 23d, when there was some abatement; but the surface of the body became cold and clammy, and he died on the 25th. He was treated with brandy, morphine, mild astringents and sinapisms. *Post-mortem* examination six hours after death: Abdomen tympanitic. The lungs were emphysematous and in their posterior parts congested; the right side of the heart contained a large fibrinous clot, the left was empty; the pericardium contained about six ounces of liquid. The liver was slightly enlarged and pale; the gall-bladder nearly filled with dark viscid bile; the spleen normal in size but dark-colored. The pericardium and omentum were congested; the mesenteric glands enlarged. The mucous membrane of the stomach was thickened and of a deep red color at its cardiac end. The small intestine was healthy to the middle of the ileum, below which point it was congested and ulcerated, the ulcers being larger and more numerous at the lower end; the apertures of the solitary follicles and tubuli were colored with black pigment, giving the mucous membrane the appearance of being covered with small black spots; the lower portion of the descending colon was considerably thickened and softened. The kidneys had a large deposit of fat about the pelves and their medullary substance was abnormally pale. [*Specimens* 407 and 408, Med. Sect., Army Medical Museum, are from this case.]—*Act. Ass't Surg. O. P. Sweet, Carver Hospital, Washington, D. C.*

(d.) Diagnosis: Cerebro-spinal meningitis.

CASE 303.*—Private Davis N. Hosmer, Co. F, 45th Mass.; age 18; was admitted Jan. 30, 1863. Two days before admission he had a slight chill, which was succeeded by violent headache, slight epistaxis and pain in the back and limbs. On admission he had severe occipital headache, fever and delirium; his head was thown back. Diarrhœa set in, but was controlled by acetate of lead and opium; cough also was troublesome, and sibilant râles were heard over both sides of the chest. On February 4 the pulse declined to 100, the skin became cool and moist and the ability to answer questions returned. Next day there was gurgling in the right iliac region. On the 6th the patient became rather stupid and affected with low delirium, but there was no diarrhœa. Several spots appeared on the abdomen on the 7th. He became comatose on the 8th and died on the 10th. *Post-mortem* examination fourteen hours after death: The cerebral membranes were slightly injected; the lateral ventricles were distended with turbid serum; a firm deposit of lymph from a quarter to three-eighths of an inch in thickness covered the inferior aspect of the cerebellum and medulla oblongata. The lungs were congested posteriorly. The heart, liver, stomach, spleen, pancreas, kidneys and bladder were normal. The solitary glands of the intestines were enlarged and Peyer's patches thickened and in one or two places ulcerated.—*Ass't Surg. J. B. Treadwell, 45th Mass., Stanley Hospital, New Berne, N. C.*

(e.) Diagnosis: Diarrhœa.†

CASE 304.—Private Milo Holmes, Co. G, 37th Mass.; age 38; was admitted July 28, 1863, having been suffering more or less from diarrhœa for the previous twelve months. He was much emaciated but was able to sit up and

* This case was published by J. B. UPHAM, *Boston Med. and Surg. Journal*, Vol. LXVIII, 1863, p. 191, as one of cerebro-spinal meningitis.

† CHARLES H. RAWSON, Surg. 5th Iowa Vols., *American Medical Times*, Vol. IV, 1862, p. 129, briefly enumerates the symptoms of two fatal cases of camp typhoid fever. These were at first regarded as diarrhœas and treated as such in quarters without any beneficial result. At the end of five days they were taken to hospital, where soon after fever of a remittent type was developed, presenting in its course a dry, red tongue; subsultus; delirium forty-eight hours before death; a pulse ranging from 120 to 160 and feeble, imperceptible at the wrist for two days preceding the fatal termination. The abdomen was tender in the first case but not in the other. Both patients succumbed ten days after the attack. The treatment consisted of the administration of stimulants and nourishment. The mucous membrane of the alimentary tract from the cardiac extremity of the stomach to the anus was

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CICATRICES OF ULCERATED PEYER'S PATCHES.

No. 459. MEDICAL SECTION.

walk around a little. He had no appetite; had several thin stools daily; his pulse was quick and weak, tongue furred, temperature of body low and breathing slow and labored. There was no marked change in these symptoms until August 6, when the stools became involuntary and he appeared to be sinking. Coma supervened on the 8th, and he died next day. *Post-mortem* examination twenty hours after death: The body was very much emaciated. The brain weighed forty ounces and a quarter; the posterior part of the cerebrum was hypostatically congested: one drachm and a half of clear serum was contained in the lateral ventricles; the brain-substance was rather firm. The trachea was pale and somewhat purplish between the rings; the lymphatic glands at its bifurcation were small and not softened, but of a moderately blackish color; the œsophageal lining was firm and of a yellowish-ochre color. The upper lobe of the right lung was hypostatically congested posteriorly, but its anterior portion was healthy; the middle lobe was of a dark-purple color and its central portion was splenified posteriorly; the weight of this lung was thirteen ounces and a half. The left lung weighed fourteen ounces and a half; it was of a dark-purple hue posteriorly and its lower lobe was considerably engorged with venous blood. The heart was normal; its cavities contained a soft jelly-like clot; a large fibrinous clot was found in the pulmonary artery, extending a long distance beyond its bifurcation, and lying on the posterior surface of the vessel surrounded by a thin venous fluid. The liver was somewhat congested; Glisson's capsule was readily torn; the gall-bladder contained six drachms of bile; the spleen was firm and of a mulberry color. The small intestine presented nothing remarkable except in the neighborhood of the ileo-cæcal valve, where were several ulcers of Peyer's patches, evidently of long standing, circular in form and penetrating to the transverse muscular fibres. The kidneys were soft and anæmic but somewhat injected on their external surface.—*Ass't Surg. H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 305.—Private Charles Jillson, Co. G, 146th Ind., was admitted Aug. 2, 1865, with chronic diarrhœa. He had pain in the hypogastric region and very frequent stools. He died on the 6th. *Post-mortem* examination: Brain normal. Lungs œdematous posteriorly, weight of each twenty-six ounces; heart normal, a black clot in the left ventricle, a mixed one in the right. Liver somewhat dark-colored and quite full of blood; spleen dark-colored, weight six ounces; pancreas and kidneys normal. The fundus of the stomach was congested, and there were longitudinal streaks of congestion in the œsophagus. The ileum was congested and Peyer's patches thickened and ulcerated, especially near the ileo-cæcal valve. The contents of the large intestine were semi-fluid and of a dark-green color mixed with a yellowish granular matter.—*Ass't Surg. George M. McGill, U. S. A., Hicks Hospital, Baltimore, Md.*

Case 306.—Private Richard Parker, Co. K, 133d Pa., was admitted Dec. 30, 1862, having been sick three weeks. When the first notes were taken, Jan. 1, 1863, the diagnosis recorded was typhoid fever, but this was afterwards changed to chronic diarrhœa. The patient was sleepless, his mouth dry and his tongue smooth, glazed and red; his emaciation was progressive and ultimately became extreme. A loose cough set in on the 12th, and a few days later he became jaundiced. He died on the 17th, having vomited a good deal of yellow matter the day before his death. *Post-mortem* examination twenty-three hours after death: There were strong pleuritic adhesions on the anterior surface of the upper lobe of the right lung; the parenchyma of the lung was congested and a purulent secretion issued from its bronchi upon pressure. The left lung was less congested, but the purulent discharge from the smaller ramifications of its tubes was of a thicker consistence than that found on the other side; cheesy tubercles were thickly scattered throughout the parenchyma of this lung except in its upper portion. The right cavities of the heart contained fibrinous clots. The liver had a nutmeg appearance and weighed forty ounces: the spleen was of a dark color and weighed three ounces and a half. The mucous membrane of the lesser curvature of the stomach was injected in points; the jejunum exhibited irregular patches of congestion in its lower part; Peyer's patches were almost destroyed. The kidneys weighed five ounces and a half each.—*Lincoln Hospital, Washington, D. C.*

Case 307.—Private Matthias Koon, Co. E, 8th N. Y.; age 50; was admitted Dec. 1, 1864, in a partially comatose condition. Diagnosis—diarrhœa and anasarca. He died on the 15th. *Post-mortem* examination: Rigor mortis marked: sudamina on left breast. Trachea congested: bronchi filled with bloody fluid: lungs congested: the middle and lower lobes of the right lung sank in water; the right lung and upper lobe of the lung were adherent to the parietal pleura. Pericardium thickened and containing six ounces of straw-colored serum. Peritoneum thickened and containing sixteen ounces of straw colored serum. Liver mottled light-brown, fatty: two ounces and a half inspissated bile in gall-bladder. Brünner's glands and Peyer's patches ulcerated: ileum inflamed: mesenteric glands filled with chalky concretions. Kidneys large and fatty.—*Third Division Hospital, Alexandria, Va.*

Case 308.—Corp'l Joseph Cole, Co. B, 2d N. Y. Mounted Rifles, was admitted July 24, 1864, much emaciated from chronic diarrhœa. Under treatment by wine, opium, catechu and milk diet he improved, and his stools were natural, August 7–9, but on the 10th his throat became swollen and covered with false membrane. He died on the 12th. *Post-mortem* examination eleven hours after death: Larynx thickly covered with false membrane; glottis œdematous. Lungs, heart, liver, spleen and kidneys normal: Peyer's patches ulcerated, especially near the ileo-cæcal valve: large intestine healthy.—*Fairfax Seminary Hospital, Va.*

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red and thickened; Peyer's glands were thickened but not ulcerated. In a third case the patches were extensively ulcerated. The nature and exient of the intestinal affection [illegible] the [illegible] of the treatment in the three cases which specially followed. Cups and blisters to the abdomen, with turpentine emulsion containing opium, and, in the presence of diarrhœa, castor oil, were successfully employed. But one fatal case occurred after this, and in it the intestinal mucous membrane was red as in the previous cases. "Every one of Peyer's patches was ulcerated to its [illegible] size, [illegible] in each case, [illegible] the [illegible]. They were from the size of a five-cent piece to the size of a dollar. Every mucous follicle and duct was thickened, raised and ulcerated from the size of a pin's head to a pea. On passing through into the cæcum, at the junction of the ileum, was an ulcer as large as a teacup. The whole mucous membrane to the rectum was in a thickened state of disorganization." [The three cases briefly sketched by Dr. Rawson appear on his Monthly Report of Sick and Wounded for December, 1861, as cases of gastro-enteritis. The thirty cases said to have terminated favorably cannot be identified on the official reports unless they are included among seventeen cases of typhoid fever, three of which were fatal, and forty-three cases of remittent fever, none of which were fatal, specified on his monthly reports for December, 1861, and January, 1862.]

CASE 309.—Private Smith Byerly, Co. C, 57th Pa.; age 22; was admitted Feb. 4, 1865, with chronic diarrhœa, and died on the 28th. *Post-mortem* examination: Right lung adherent for the upper two-thirds of its extent; eight ounces of a sero-purulent liquid in the pleural sac; pericardium inflamed and its cavity literally filled with pus. Liver, spleen and kidneys very much softened. Ileum perforated at its junction with the colon, the aperture being about the size of a Spanish half-dollar; small intestine much inflamed, with some degree of ulceration scattered throughout and well-marked ulceration of the glands of Peyer.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

CASE 310.—Private Charles M. Delano, Co. I, 7th Me., was admitted Aug. 10, 1862, with diarrhœa, and died on the 20th. *Post-mortem* examination next day: Body exceedingly emaciated; apparently about thirty-five years of age. Lungs healthy although adherent to the costal pleura throughout; heart, liver and spleen normal. The mucous membrane of the stomach presented numerous injected points about the size of mustard-seed, and the rugæ along the great curvature near the pylorus were inflamed. The ileum was inflamed in patches, some of them intensely; the lower fifteen agminated glands were ulcerated, some completely, others with from one to three small ulcers; the upper glands were inflamed but not ulcerated. The colon was inflamed, especially in its descending portion, which presented many small black stellate ulcers in positions formerly occupied by solitary glands; a patch of intense inflammation, extending from the sigmoid flexure into the rectum, was covered with an opaque-white membranous matter which the microscope exhibited as a fibro-granular substance mingled with desquamated epithelium. —*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia, Pa.*

CASE 311.—Private J. R. Everts, Co. G, 2d E. Tenn.; age 22; was admitted from Richmond, Va. (a paroled prisoner), April 18, 1864, with diarrhœa. He died May 3d. *Post-mortem* examination twenty-four hours after death: Large vomica in left lung with two quarts of effusion in pleural cavity, pushing the heart to the right side; vomica in middle lobe of right lung and tubercular deposit in upper lobe with adhesion of pleural surfaces. Heart flabby and pale; aortic valves thickened. Spleen soft and friable; gall-bladder empty. Peritoneum inflamed; omentum, lower part of ileum and whole of rectum gangrenous.—[*Specimens* 307 and 308, Med. Sect., Army Medical Museum, showing ulceration of the solitary follicles and Peyer's patches, with exuded lymph on the peritoneal surface, are from this case.]—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

CASE 312.—Private Gilbert F. Sherwood, Co. K, 144th N. Y., was admitted July 20, 1863, with chronic diarrhœa. Typhoid symptoms set in about August 1. The low delirium was conceived to have been favorably influenced by a large blister over the epigastrium. He died on the 21st. *Post-mortem* examination twelve hours after death: The whole of the intestines were inflamed, especially the caput coli and twenty inches of the ileum, the mucous membrane presenting a deep-red, velvety appearance with many ulcerated patches. [*Specimen* 76, Med. Sect., Army Medical Museum, shows the ulcerated patches of the ileum and the follicular ulcers of the cæcum in this case.]—*Act. Ass't Surg. F. Hinkle, Jarvis Hospital, Baltimore, Md.*

CASE 313.—Private John Weiant, Co. E, 118th Pa.; age 23; was admitted Aug. 30, 1864, with diarrhœa. On September 13 he became much prostrated by constant vomiting and diarrhœa. He died on the 20th. *Post-mortem* examination eighteen hours after death: Some emaciation. The brain was normal. The larynx and trachea contained a large quantity of frothy rose-colored sputa. The right lung weighed thirty-one ounces and a half and was much congested and hepatized posteriorly, exuding on section much frothy, rust-colored sputa; the left lung weighed fourteen ounces and contained a similar frothy, reddish fluid. The heart inclosed a medium-sized fibrinous clot in its right side and a small one in the left. The liver weighed eighty-one ounces; the spleen sixteen ounces. The stomach was normal; the solitary follicles of the lower ileum were enlarged and Peyer's patches ulcerated, there were a few small ulcers in the cæcum, but the large intestine was otherwise normal; the left kidney was much congested.—*Act. Ass't Surg. H. M. Dean, Lincoln Hospital, Washington, D. C.*

CASE 314.—Corp'l Andrew Richardson, Co. K, 189th N. Y., was admitted Jan. 17, 1865, with chronic diarrhœa, and died on the 29th. *Post-mortem* examination: The right lung weighed forty ounces and the left twenty ounces; the right pleural sac contained pus, and the lung was adherent and hepatized; the heart weighed eight ounces, the liver seventy-four ounces and the spleen eight ounces and a half. The stomach was injected at its cardiac end; the jejunum much inflamed; the ileum injected and Peyer's patches thickened and ulcerated; there were some small ulcers in the upper part of the colon.—*Fifth Army Corps Field Hospital.*

CASE 315.—Private Orlow Lawrence, Co. F, 140th N. Y., was admitted Jan. 17, 1865, with chronic diarrhœa, having previously suffered from what was supposed to be remittent fever. He died on the 26th. *Post-mortem* examination: The right lung weighed eighteen ounces, the left thirteen ounces and a half; there was an abscess in the lower lobe of the left lung, and the left pleura contained twenty-four ounces of serum with much plastic lymph. The liver weighed seventy-two ounces and presented the nutmeg appearance; the spleen weighed six ounces. The ileum was injected throughout; Peyer's patches were thickened and ulcerated as was also the colon; the mesenteric glands were much enlarged.—*Fifth Army Corps Field Hospital.*

CASE 316.—Private John H. Benjamin, Co. H, 127th N. Y., was admitted July 29, 1863, with chronic diarrhœa of three months' standing. A few days after admission it was discovered that he was also laboring under a tertian ague; this was controlled by quinine, but the diarrhœa continued. He had a scorbutic appearance; his gums were spongy and he was feeble and emaciated. He gradually sank, and died comatose August 27. *Post-mortem* examination: Peyer's patches were extensively ulcerated and the solitary follicles enlarged. The mucous membrane of the rectum was converted into a pulpy mass.—*Act. Ass't Surg. W. H. Letterman, Douglas Hospital, Washington D. C.*

CASE 317.—Private J. W. Foreman, Co. M, 5th U. S. Art.; admitted Oct. 10, 1863; chronic diarrhœa. Died 17th. *Post-mortem* examination: Body somewhat emaciated. Lungs normal; heart atrophied. Liver slightly hypertrophied; gall-bladder distended; spleen enlarged. Stomach congested; duodenum congested and thickened; jejunum normal; Peyer's patches enlarged, congested and in some instances ulcerated; colon congested, thickened and ulcerated in patches; rectum thickened. Right kidney normal, left fatty.—*Harewood Hospital, Washington, D. C.*

CASE 318.—Corp'l Charles M. Mosher, Co. A, 122d N. Y.; admitted April 21, 1863. Chronic diarrhœa. Died May 7. *Post-mortem* examination: Body much emaciated. The right lung, heart and pericardium were healthy; the lower lobe of the left lung was hepatized and a portion of its pleura thickened. The liver was mottled and fatty; the spleen mottled and double the usual size. The stomach was healthy; the duodenum injected in patches; the jejunum slighly injected and presenting small ulcers; the mucous membrane of the ileum was congested in patches, thinned and softened, and Peyer's glands were reddened and ulcerated. The ascending and descending portions of the colon presented small purple spots with, in the former, several small distinct ulcers, some of which were healed; there was one large inflamed patch in the transverse colon and a purple spot three inches long in the rectum. Some cysts were observed in the kidneys.—*Act. Ass't Surg. H. Hirshfield, Harewood Hospital, Washington, D. C.*

CASE 319.—Private William Green, Co. B, 6th Mich. Cav., was admitted July 30, 1863, with chronic diarrhœa. Under treatment he seemed to improve until August 10, when sudden prostration came on. Next day he felt better, but in the evening the prostration recurred with slight delirium, lasting until death, on the 12th. *Post-mortem* examination eighteen hours after death: Lungs somewhat congested. Solitary follicles of intestines ulcerated; Peyer's glands enlarged, inflamed and ulcerated.—*Third Division Hospital, Alexandria, Va.*

CASE 320.—Private David Rumbaley, Co. A, 32d Mass.; age 20; was admitted August 30, 1864, having been sick for two weeks at City Point, Va., with diarrhœa and occasional rigors. He was emaciated, had anorexia, pain in both hypochondriac regions and severe diarrhœa with involuntary stools; his tongue was coated in the centre with a dark fur. On September 4 there was intense pain in the right side of the chest, with slight cough, accelerated pulse and breathing and continuance of the anorexia, diarrhœa and progressive debility. Delirium, with great prostration, set in next day, and he died on the 6th. *Post-mortem* examination: The larynx and trachea were healthy; the lungs were congested, the left markedly so, and while both were in part closely and firmly adherent to the parietes the right had a coating of recent lymph on its pleura. The pericardium was firmly adherent to the costal cartilages and sternum; the right side of the heart contained a large fibrinous clot, but the left was nearly empty. The liver was enlarged and soft and connected by recent lymph to the abdominal wall and the diaphragm; the spleen was enlarged, soft, of a dark-brown color, coated with recent lymph and adherent to the abdominal wall. The stomach was red and congested towards the cardia, thickened and softened at the pylorus. The small intestine, distended with flatus, was healthy in its upper part, but toward the ileum the agminated glands and the mucous membrane around them were congested; lower down these glands and the solitary follicles were enlarged and prominent, occasionally presenting deep ulcers with red areolæ, which became more numerous and stained with yellow pigment near the ileo-cæcal valve. [*Specimens* 424 and 425, Med. Sect., Army Medical Museum.] The large intestine was distended with air: the ascending colon congested and presenting a few small ulcers; the transverse and descending portions slightly congested and the orifices of their solitary follicles covered with black pigment; the mesenteric glands enlarged. The kidneys were normal.—*Act. Ass't Surg. O. P. Sweet, Carver Hospital, Washington, D. C.*

(f.) Diagnosis: Dysentery.

CASE 321.—Private Thomas Jones, Co. A, 1st U. S. Art., was admitted March 16, 1865, with dysentery, and died on the 23d. *Post-mortem* examination: Rigor mortis well marked. Right lung completely hepatized; left lung, heart and pericardium normal. Stomach inflamed along its lower border and pyloric orifice; lower part of ileum slightly inflamed and Peyer's glands ulcerated, the ulcers surrounded by a red areola.—*Fort Strong, Va.*

CASE 322.—Private William H. Morse, Co. H, 147th N. Y.; age 33; was admitted Aug. 20, 1864, with dysentery of four weeks' standing. He had about twelve passages daily, with tormina and tenesmus. The disease did not yield to treatment. He died on the 30th. *Post-mortem* examination: Peyer's patches were much ulcerated, some to the muscular coat and one perforating the intestine, [*Specimens* 374 and 375, Med. Sect., Army Medical Museum,] but there was no liquid in the abdominal cavity: a small cul-de-sac existed in the ileum.—*Act. Ass't Surg. D. L. Haight, Douglas Hospital, Washington, D. C.*

CASE 323.—Private Addison Griffin, Co. G, 144th N. Y., was admitted July 29, 1863, with typhoid dysentery. He was much prostrated for two hours after his entry, but he rallied and seemed in fair condition; pulse 88 but feeble; much tormina and tenesmus; abdomen tender upon pressure, especially over the ileo-cæcal valve; tongue smooth, glossy and red in front and coated white with a greenish-yellow tinge behind. On the day of admission the discharges consisted of glairy mucus specked in a few places with blood. Pills of lead acetate, opium and blue mass, with an opiate enema, gave him a rather quiet night, with only four passages, so that next morning his condition was encouraging: but at 4 P. M. he passed a large quantity of blood from his bowels and died within an hour. *Post-mortem* examination fifteen hours after death: The mucous coat of the small intestine was softened in its whole course and in many places not able to bear its own weight: the glands of Peyer were softened and ulcerated, some completely disorganized: the mesenteric glands were enlarged to the size of a pigeon's egg. The large intestine in its whole length was softened and disorganized.—*Act. Ass't Surg. W. H. Letterman, Douglas Hospital, Washington, D. C.*

CASE 324.—Private Gustavus Frank, Co. B, 20th N. Y., was admitted July 26, 1862, with chronic dysentery, and died August 9. *Post-mortem* examination the same day: The body was much emaciated. The heart was pale and

flabby, with opaque, white patches on the right ventricle about the size of a dime and similar but quite small patches on both auricles, together with some roughness of the corresponding portions of the pericardium. The lungs, liver, stomach, pancreas and spleen were healthy. The mucous membrane of the ileum was inflamed and the agminated glands, with the exception of the upper ones, were thickened and inflamed and in several instances presented small ulcerations, [*Specimens* 242 and 243, Med. Sect., Army Medical Museum;] the mesenteric glands were tumefied. The mucous membrane of the colon was inflamed, especially towards its extremities.—*Act. Ass't Surg. Joseph Leidy, Satterlee Hospital, Philadelphia, Pa.*

(g.) Diagnosis: Typhoid debility.

Case 325.—Private Howard Rice, Co. H, 206th Pa.: age 27; was admitted Oct. 14, 1864, with debility, and died on the 30th from gastric and intestinal hemorrhage. *Post-mortem* examination forty-two hours after death: Muscles well developed. The spleen was dark-colored, enlarged and softened. Peyer's patches in the lower part of the ileum and a few solitary follicles in the cæcum and in the first six inches of the colon were thickened and ulcerated, but beyond this the large intestine was normal. The lungs, heart, liver and kidneys were normal; the stomach was healthy but contained four ounces of grumous liquid.—*Act. Ass't Surg. Thomas Bowen, Second Division Hospital, Alexandria, Va.*

Case 326.—Private Jeremiah Blair, Co. C, 202d Pa.: age 38: was admitted Nov. 4, 1864, with debility, and died on the 6th. *Post-mortem* examination: Peyer's patches near the ileo-cæcal valve were thickened and ulcerated in two or three places; the mesenteric glands were enlarged: the liver dark-colored; the spleen enlarged: the other organs healthy.—*Second Division Hospital, Alexandria, Va.*

Case 327.—Private Isaac H. Cole, Co. M, 6th Pa. Art.: age 40: admitted Oct. 17, 1864; died November 7. *Post-mortem* examination twenty-six hours after death: Marked rigor mortis: no emaciation; extensive suggillation posteriorly. The left lung was congested posteriorly and a small portion of its upper lobe was hepatized; there was an ounce of serum in the right pleural cavity and two ounces in the left. The pericardium, which was slightly reddened, contained four ounces of serum. The great omentum was inflamed and adherent to the small intestine, the coils of which were interadherent: there were extensive deposits of lymph on the peritoneum, and the cavity contained two pints of a thick straw-colored liquid having a fæcal odor and some floating shreds and small masses, apparently fæcal, about the size of barley-grains. The liver was enlarged: the coats of the gall-bladder were disorganized from extension of the peritonitis; the pancreas normal; the spleen enlarged and softened. Several of Peyer's patches in the lower ileum were thickened and ulcerated, one ulcer about two feet from the ileo-cæcal valve having perforated; the mucous coat of the cæcum and of the first few inches of the colon was inflamed and thickened: the mesenteric glands were much enlarged and quite dark.—*Second Division Hospital, Alexandria, Va.*

Case 328.—Private William DePraley, Co. I, 118th Pa.: admitted Oct. 10, 1863. Debility. Symptoms of peritonitis were observed on the evening of the 28th. Died 29th. *Post-mortem* examination: Body much emaciated. The lungs and heart were normal; the pericardium contained four ounces of liquid. The abdominal cavity contained a large quantity of serum; the liver was adherent to the adjoining viscera; the gall-bladder, spleen, stomach, duodenum, jejunum and kidneys were normal. The ileum was inflamed and Peyer's glands ulcerated; one of the ulcers just above the ileo-cæcal valve had perforated the peritoneum; the colon and rectum were much inflamed. —*Harewood Hospital, Washington, D. C.*

(h.) Diagnosis: Bronchitis.

Case 329.—Private John Connor, Co. B, 28th Mass.; age 22: was admitted Oct. 18, 1863, with acute bronchitis, and died November 8. *Post-mortem* examination twenty-two hours after death: The brain was natural. The larynx and trachea were inflamed: the mucous membrane above the chordæ vocales was greenish-brown in color and much puffed out and thickened, particularly on the right side; a slight exudation was observed on the cords and under surface of the epiglottis; the sub-epiglottidean follicles were enlarged, softened and blackened: the mucous membrane below was of a paler color but still greenish, becoming grayish in the bronchi. The œsophagus was inflamed, its lower part dark purplish-red and presenting numerous purpura-like spots which invaded the sub-mucous tissue, its upper part greenish-brown and very much softened and thickened. The right lung weighed fifteen ounces, contained much pigmentary matter, was well filled with air and on section exuded little or no bronchial secretion: the left lung weighed twelve ounces and was healthy, excepting the slate-color of the bronchial membrane; the pleural cavities contained three pints of serum. The heart was firm and almost free from clots; three ounces of fluid were found in the pericardium. The liver was perfectly healthy: the spleen was firm and weighed three ounces and three-quarters; the pancreas four ounces. The small intestine was thin and the valvulæ conniventes almost obliterated; the solitary follicles were not enlarged; Peyer's patches were of a deep-brown color and but little elevated—such as were ulcerated were surrounded by a light-red areola, but the ulcerations were in no place deep and had everywhere the appearance of undergoing the healing process. The large intestine was of a darkish gray color, its solitary glands normal. Both kidneys were somewhat congested.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 330.—Private E. B. Dolph, Co. B, 27th Conn., was admitted March 9, 1863, having been suffering for six weeks from a rather severe attack of bronchitis, for which he had been treated in quarters. On admission his pulse was 108, tongue clean and moist; he had considerable cough with white frothy sputa and some substernal soreness; his stools were rather infrequent (not daily) but loose and watery. Next day he seemed better; pulse 84. On the 11th his pulse was 108, respiration 20, tongue furred and a little tinged with brown, and he had one watery passage in the preceding twenty-four hours. He continued in this condition until the 14th, when he had three loose passages

and complained of some tenderness over the whole course of the colon. Next day the pulse and respiration became slightly accelerated and the tongue dry; he had two loose passages. On the 16th the pulse was 120, the respiration 28, the lips dark in patches, the tongue dry and dark; he did not answer questions sensibly; the abdomen was tender all over; his cough was loud, dry and very annoying; the respiratory murmur was absent and there was dulness on percussion from the lower extremity of the scapula downwards on the right side, but elsewhere the murmur was loud and dry. Tubular breathing was heard on the 17th below the fifth rib on the right side anteriorly and laterally. He died on the 20th. The cough ceased during the last three days of life. The abdomen was at no time tympanitic nor were any rose-colored spots observed. *Post-mortem* examination: [The condition of the thoracic viscera is not recorded.] There were about twenty-five indurated Peyer's patches in the ileum, six of which were ulcerated; the ileo-cæcal valve was thickened and presented an indurated, slightly ulcerated patch on its cæcal surface; the neighboring parts of the ileum and colon were much congested; the mesenteric glands were enlarged. [*Specimen* 150, Med. Sect., Army Medical Museum, is from this case.]—*Surg. W. O. McDonald, Hospital, 27th Conn. Vols.*

(i.) Diagnosis: Pneumonia or typhoid pneumonia.

Case 331.—Private Orlando Stevens, Co. A, 5th Vt., was admitted Jan. 2, 1863, with pneumonia. As marked typhoid symptoms were present a supporting treatment was adopted. He improved to within a day or two before his death, when prostration set in. He complained at one time of a dull pain in the left breast and of some difficulty in breathing; he had also a slight diarrhœa. He died on the 16th. *Post-mortem* examination six hours after death: Body much emaciated; skin sallow and tightly stretched. The lower part of the upper lobe of the left lung contained a few small masses of hepatized tissue; the lower lobe was hepatized, its small bronchi filled with false membrane and its whole surface covered with a thin layer of exuded lymph. The spleen was small but of normal consistence and color; the kidneys and liver were natural. The stomach was contracted, its greater curvature having strongly marked rugæ in front and towards the pyloric orifice; the fundus was injected, particularly at the lowest point and near the cardiac orifice; the mucous membrane to the right of the cardiac and towards the pyloric orifice was mammillated. The small intestine was healthy to the upper end of the ileum; below that point it was congested in patches which occupied about half the surface for two feet and a half in length, thence it was uniformly congested to the ileo-cæcal valve. Peyer's patches were punctated—some were reddish; they were slightly swollen and much softened; within a foot of the ileo-cæcal valve were eight or ten over which the mucous membrane was eroded, while the muscular tissue beneath was much congested; the ulcers as a rule did not occupy the whole of these patches, but in the middle third of the ileum there were several in which this was the case; the mesenteric glands were normal. The peritoneal surface of the cæcum was congested; the mucous membrane of the descending colon was slightly congested near its commencement, then slaty in color to the sigmoid flexure; in the lower two-thirds of the gut the solitary glands were distinctly marked and filled with a dark-blue deposit; in the sigmoid flexure were several small ulcerations not exceeding a line in diameter, but the mucous membrane was of normal consistence.—*Act. Ass't Surg. T. R. Dunglison, Lincoln Hospital, Washington, D. C.*

Case 332.—Private M. W. Knowles, Co. D, 67th Pa., was admitted Feb. 3, 1864, with pneumonia, and died on the 8th. *Post-mortem* examination: The right lung, excepting a part of its anterior margin, was hepatized; the left was congested. The liver was slightly granular and fatty; the spleen large, soft and of a dull purple color internally; the kidneys congested. Peyer's patches in the lower part of the ileum were ulcerated but the surrounding villi were not affected. [*Specimen* 201, Med. Sect., Army Medical Museum.] The large intestine presented isolated ulcers mostly confined to the cæcum; the mucous membrane was of a dull whitish-blue color.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 333.—Private L. M. Cole, Co. E, 16th Me.; age 20; was admitted March 26, 1864, with pneumonia, and died on the 28th. *Post-mortem* examination twenty-three hours after death: Body much emaciated. Brain healthy. Trachea much congested; right lung twenty-six ounces, left twenty ounces—both congested; bronchi filled with bloody mucus and each pleural sac containing a small quantity of bloody serum. Heart pale. Liver anæmic, weighing fifty ounces; spleen healthy, nine ounces. Œsophagus and stomach normal; small intestine much congested, especially towards the ileo-cæcal valve, where the mucous membrane was of a bluish-slate color; Peyer's patches and the solitary follicles prominent, several showing points of ulceration; large intestine congested near the caput coli. Mucous membrane of bladder around orifices of ureters dark-bluish colored in spots, varying in size from a pea to a large cent.—*Act. Ass't Surg. H. M. Dean, Lincoln Hospital, Washington, D. C.*

Case 334.—Private Henry Shrum, Co. F, 2d Md.; age 55; was admitted Sept. 6, 1865, with pneumonia. Two weeks before his entry he had a chill lasting for half an hour, followed by oppression in the chest, with complete anorexia for five days. On admission he had diarrhœa, a suffocative feeling on taking a deep breath, a purple pustular eruption on his body and coldness of the hands and feet. He died on the 8th. *Post-mortem* examination: Left lung adherent and collapsed posteriorly; right lung congested generally and solidified posteriorly. Spleen enlarged and softened. Peyer's patches of ileum elevated, enlarged and in some instances ulcerated; solitary glands of colon and rectum enlarged and presenting the shaven-beard appearance. Kidneys with many superficial cysts containing a transparent light-brown fluid.—*Act. Ass't Surg. Carlos Carvallo, Douglas Hospital, Washington, D. C.*

Case 335.—Private John Strickland, Co. E, 103d Ill.; age 34; was admitted June 21, 1863, with typhoid pneumonia. He was delirious on admission, but it was learned that he had been seriously ill for two or three weeks. His pulse was small, tongue dry, thirst excessive; he had not much diarrhœa, but expectorated large quantities of purulent matter. His condition remained unchanged until the morning of the 23d, when a large pool of bright-red blood, which had flowed from his bowels, was discovered under the bed. Ten drops of solution of perchloride of iron were

ordered to be taken every thirty minutes, and the patient was placed on another bed; but he continued to bleed so freely that this also became speedily soaked. By the time the third dose of the iron was given the bleeding had ceased, but the patient was extremely exhausted and almost pulseless. He rallied, however, and seemed to be doing well until the evening of the 26th, when he suddenly became restless and his pulse accelerated. He died next morning. *Post-mortem* examination ten hours after death: The mesenteric glands were enlarged, softened and in some cases nearly broken down. Only two ulcerated Peyer's patches were found; these were large and ragged, situated a short distance from the ileo-cæcal valve; there was no blood in the intestines.—*Lawson Hospital, St. Louis, Mo.*

Case 336.—Private Morris Hyatt, Co. A, 142d Ohio National Guard; age 21; was admitted July 28, 1864, with typhoid pneumonia. He was delirious and had a slight cough, without expectoration, and an infrequent diarrhœa. In the progress of the case the pulse became rapid and weak, the breathing hurried and the countenance dusky. He died August 1. *Post-mortem* examination six hours after death: Rigor mortis marked. The lungs were engorged posteriorly and some of the lobules hepatized. The liver was engorged, enlarged and softened; the spleen softened. The mucous membrane of the stomach in the region of the greater curvature was much softened and easily torn. Peyer's patches and the solitary glands of the small intestine were extensively diseased, this condition becoming more marked toward the lower end of the ileum; for three or four feet above the ileo-cæcal valve the morbid patches were circular, from the size of a pinhead to that of a two-cent piece, or oval, some of the latter having the greater axis over two inches long with a thickness in some cases of three-sixteenths of an inch; they were firm, the edges smooth and regular, the surfaces in those most advanced slightly excavated and in all more or less covered with a yellowish-green, easily detached coating or deposit. [See *specimens* 376–380, Med. Sect., Army Medical Museum, and plates facing pages 410, 412 and 436, *infra*.] The mesentery was greatly thickened and the glands enlarged, some to the size of a large peach-stone, [*Specimen* 381, Army Medical Museum.] The large intestine was generally healthy. The kidneys were normal.—*Douglas Hospital, Washington, D. C.*

Case 337.—Private Frederick Brand, Co. E, 11th Pa.; admitted Jan. 7, 1865; typhoid pneumonia. Died February 1. *Post-mortem* examination ten hours after death: Both lungs were hepatized (gray) and closely adherent to the costal pleura. Slight adhesions existed between the liver, diaphragm, ascending colon and small intestine; the intestines were covered with plastic lymph; the abdominal cavity contained twelve ounces of a colorless liquid; the mesentery was thickened and congested throughout and contained large, soft, white deposits which resembled tubercle. The duodenum was healthy; the upper part of the jejunum was slightly congested in spots and its lower part presented a large ulcer; the ileum was congested throughout and Peyer's patches ulcerated. The ascending colon was healthy; the rest of the colon and the rectum much congested but not ulcerated. The other viscera were normal.—*Act. Ass't Surg. C. T. Trautman, Harewood Hospital, Washington, D. C.*

Case 338.—Serg't Alexander M. Elgin, Co. B, 139th Pa.; admitted April 21, 1863; typhoid pneumonia. Died May 21. *Post-mortem* examination: The left parotid gland and surrounding cellular tissue formed the site of an abscess which penetrated to the œsophagus. The lungs and heart were normal. The duodenum and jejunum were dark-lead colored and contained fresh bile; the ileum was thin and dark colored, its mucous membrane much injected; Peyer's patches and certain of the solitary glands were deeply colored, softened and in some instances ulcerated. The large intestine exhibited large black spots scattered over its surface. The liver was black on its under surface, its parenchyma fatty; the gall-bladder distended with bile; the spleen and kidneys normal.—*Act. Ass't Surg. Thos. H. Elliott, Harewood Hospital, Washington, D. C.*

Case 339.—Private H. F. Wardwall, Co. D, 33d Mass., was admitted Feb. 9, 1863, with great dyspnœa and complete aphonia. Death occurred from suffocation on the 15th. There was no indication during life of any intestinal lesion, nor was the patient emaciated as he would probably have been if just recovering from typhoid fever or chronic diarrhœa. *Post-mortem* examination: The lungs were much congested, but there seemed to be enough of comparatively healthy tissue to have enabled respiration to go on. The trachea was highly inflamed, the larynx ulcerated and the glottis occluded by œdema. The mucous membrane of the small intestine, and especially of the ileum, presented the softened and tumefied aspect usually found in cases of chronic diarrhœa, and there were numerous ulcers, one near the cæcum being two inches in diameter. [*Specimen* 207, Med. Sect., Army Medical Museum, showing ulceration of Peyer's glands, is derived from this case.]—*Med. Cadet E. Coues, U. S. A., Mount Pleasant Hospital, Washington, D. C.*

(k.) Diagnosis: Pleurisy.

Case 340.—Private Henry Mead, Co. D, 10th N. Y. Cav.; age 19; was admitted April 7, 1865, with pleurisy. [He entered the cavalry corps hospital, City Point, Va., March 27, diagnosis chronic diarrhœa, and was transferred to Lincoln hospital, Washington, D. C., April 1, where his case was registered bronchitis.] He was pale and much debilitated; tongue white; bowels loose; appetite poor; pulse full, weak, not frequent, intermittent and sometimes resembling the whir-r-r of an aneurism; breathing hurried and difficult; he was unable to lie on his right side. Physical examination discovered dulness over the left lung and inferiorly over the right lung, crepitation over the right lung posteriorly, with a large moist râle over its middle lobe and a sibilant râle over its lower lobe and displacement of the heart four inches towards the right, its apex seeming to be under the right nipple. He died on the 12th. *Post-mortem* examination: There were two gallons of bloody liquid in the left thoracic cavity; the left lung was compressed against the spinal column and so dense as to sink in water; the right was passively congested, especially in its lower lobe. The heart was displaced to the right and contained a soft coagulum in its left cavities, a fibrinous one in the right; there was slight effusion into the pericardium. The liver was somewhat congested. The small intestine was congested and some of Peyer's patches were ulcerated.—*Satterlee Hospital, Philadelphia, Pa.*

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SLIGHTLY THICKENED PEYER'S PATCHES.

No. 377. MEDICAL SECTION.

(B.) CONDITION OF PEYER'S PATCHES NOT STATED; THE ILEUM OR THE SMALL INTESTINE SAID TO HAVE BEEN ULCERATED—21 CASES.

(a.) Diagnosis: Intermittent fever.

CASE 341.—Private Jacob Shoulders, Co. B, 15th Va.; age 26; was admitted Aug. 31, 1864, with intermittent fever, and died September 13 with typhoid symptoms. *Post-mortem* examination: Hypostatic congestion of both lungs. Liver large, weighing five pounds; spleen very large, twenty-six ounces; left kidney small, three ounces; ileum for three feet above the ileo-cæcal valve intensely inflamed and containing thirty ulcers, some of the size of a silver dollar.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

(b.) Diagnosis: Cerebral disease.

CASE 342.—Private Zebulon F. Whittaker, Co. B, 16th Me., was admitted Feb. 1, 1865, as a convalescent from typhoid fever. He was hypochondriacal and nostalgic, complaining of severe headache, intense lumbar pain and constipation. Blisters were applied behind the ears and dry and wet cups to the back with but temporary relief. He vomited large quantities of a greenish watery liquid, and later had involuntary stools and paralysis of the bladder necessitating catheterism. He became very restless and noisy, and on the 20th had to be fastened to his bed to prevent his leaving it. He died on the 24th. *Post-mortem* examination: Brain normal. Lungs congested, softened and friable. Stomach showing numerous ecchymoses; ileum and ileo-cæcal valve presenting a few isolated ulcers. Bladder thick, small, ecchymosed.—*Act. Ass't Surg. Carlos Carrallo, Douglas Hospital, Washington, D. C.*

(c.) Diagnosis: Diarrhœa.

CASE 343.—Private R. M. Hapman, Co. F, 150th N. Y.; age 41; was admitted July 9, 1863, with chronic diarrhœa and general debility. He was doing well up to August 22, when meningitis supervened, and he died on the 25th. *Post-mortem* examination: Close adhesion between the pia mater and the hemispheres of the cerebrum, with an unusual quantity of serum in the subarachnoid spaces; ossification of a Pacchionian granulation, [*Specimen* 41, Med. Sect., Army Medical Museum.] Lungs and heart healthy; liver and spleen softened and congested; ileum inflamed and ulcerated in patches.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

CASE 344.—Private Franklin Sollans, Co. E, 122d Ohio; age 22; was admitted Aug. 12, 1864, with diarrhœa, and died on the 19th. *Post-mortem* examination: The vessels of the pia mater were anæmic and seemed to contain globules of air; there were two ounces of serous effusion at the base of the brain; the third ventricle contained one ounce of liquid; the brain-substance was natural. There was extensive interlobular emphysema of both lungs, which were congested posteriorly; the areolar tissue of the anterior mediastinum was infiltrated with air. The heart and kidneys were natural; the liver large; the spleen congested. There were three ulcers in the ileum; two of which were one inch and the other eight inches above the ileo-cæcal valve; the mucous membrane to the extent of a foot from the valve was very much congested.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

CASE 345.—Private Charles A. Taylor, Co. A, 9th Mich. Cav.; age 18; admitted dead, March 1, 1864, having died in the ambulance on the way to hospital. *Post-mortem* examination fourteen hours after death: Body greatly emaciated. The lungs were healthy; the heart small and flabby. The liver was large but of normal consistence; the left kidney engorged with blood, the right small and apparently fatty. The omentum had lost its fat; the mesenteric glands were enlarged and there were indications of former peritonitis. The stomach was healthy; the mucous membrane of the ileum was destroyed by ulceration in many places and thickened in others.—*Surg. Wm. C. Otterson, U. S. V., Hospital No. 8, Nashville, Tenn.*

CASE 346.—Private Martin O'Neil, Co. E, 14th N. J.; age 40; was admitted Nov. 5, 1864. He had been sick for two weeks with diarrhœa complicated with kidney disease and œdema of the hands and feet. He died Jan. 30, 1865. *Post-mortem* examination nineteen hours after death: Mucous membrane of ileum and cæcum ulcerated in a dozen patches, two of which perforated the gut about two feet above the ileo-cæcal valve; abdominal cavity contained about six ounces of pus. Left kidney somewhat enlarged, pale and mottled; right normal in size but congested.—*Act. Ass't Surg. S. P. White, Ward Hospital, Newark, N. J.*

CASE 347.—Private Rudolph Norman, Co. G, 28th Mass.; age 28 (a paroled prisoner); was admitted from Richmond, Va., April 18, 1864, with chronic diarrhœa. He died June 4. *Post-mortem* examination twenty-four hours after death: Lungs healthy; heart flabby and anæmic, filled with white clots; liver adhering by its entire upper surface to diaphragm; spleen large; mucous coat of intestines much congested and thickened; ileum perforated in ten or twelve places by ulcers; peritoneum congested and adherent in many places.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

CASE 348.—Private Alfred A. King, Co. F, 2d Pa. Cav.; age 16; admitted Aug. 9, 1864, from Army of Potomac; chronic diarrhœa. Died next day. *Post-mortem* examination: Much emaciation; enlargement and suppuration of parotid glands. Ulceration of ileum, cæcum and part of colon; a half-pint of lumbricoid worms scattered through the intestinal canal and quite a lot of them in the cæcum.—*Third Division Hospital, Alexandria, Va.*

(d.) Diagnosis: Debility.

CASE 349.—Private Henry C. Davis, Co. C, 9th N. Y. Cav.; age 32; was admitted July 23, 1863, with debility. He was appointed an assistant nurse, but symptoms of meningitis came on, for which cups, blisters and enemata were employed. He died August 3. *Post-mortem* examination fourteen hours after death: "On removing the cerebrum slight adhesion was found on the left side with some effusion, the meninges of the brain being softer than usual. The liver was congested and weighed four pounds and six ounces, and an ulcer was found in it near the gall-

bladder: the spleen weighed two pounds and four ounces. There was ulceration along the ileum." *Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

Case 350.—Private Lyman Avery, Co. I, 9th N. Y. Cav.; age 23; was admitted July 20, 1863, with debility, and died August 14. *Post-mortem* examination twenty hours after death: Brain, lungs, heart and liver healthy; ileum showing cicatrices of old ulcers in their different stages.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

Case 351.—Private Henry Lott, Co. D, 173d N. Y.; age 22; was admitted Oct. 29, 1863, suffering from cough and typhoid debility. Next day it was noted that his abdomen was covered with purple spots, and on November 2 that he had dysentery but with little tenesmus. He was treated with carbonate of ammonia, whiskey, nourishment and hot applications to his extremities. He died on the 3d. *Post-mortem* examination twenty-six hours after death: Inflammation and ulceration of the intestines.—*Act. Ass't Surg. W. W. Royal, Hospital, Annapolis, Md.*

(e.) Diagnosis: Rheumatism.

Case 352.—Private Daniel Repploged, Co. A, 61st Pa.; age 28; was admitted Aug. 23, 1864, with rheumatism, and died September 22. *Post-mortem* examination twenty-four hours after death: The middle lobe of the right lung was hepatized and infiltrated with pus. The ileum was intensely congested in spots and presented four large ulcers at a little distance from the ileo-cæcal valve. The bladder was very much thickened and contracted.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

(f.) Diagnosis: Pneumonia or typhoid pneumonia.

Case 353.—Private Richard Vaughn, Co. F, 146th Ind.; age 26; was admitted June 8, 1865, having been sick for ten days with pneumonia. On admission his bowels were rather loose and he had some cough with free expectoration. He improved steadily until the 13th, when permission was given him to go to Cumberland to be mustered out; but he became much exhausted by the way, was abandoned by his friends, and returned to the hospital on the 14th in a prostrate condition. He died on the 17th. *Post-mortem* examination eight hours after death: There were pleuritic adhesions on both sides. The abdominal cavity contained a quantity of serum and the intestines were coated with coagulable lymph. The liver was large, intensely congested and softened; the spleen large, congested, softened and of a black color. The mucous membrane of the jejunum, ileum and cæcum was inflamed, softened and ulcerated.—*Act. Ass't Surg. S. B. West, Cumberland Hospital, Md.*

Case 354.—Private Philip Dick, Co. A, 187th N. Y.; age 28; was admitted Feb. 20, 1865, with pneumonia. He died March 4. *Post-mortem* examination eight hours after death: Purpuric spots, the largest one-fourth of an inch in diameter, were scattered on the lower extremities. The lower lobe of each lung was deeply congested and on the outside of the left was a sunken star-shaped cicatrix, with beneath it a collection of tubercular matter about as large as a butternut, connected at its inner side with one of the bronchial tubes. The heart was healthy and contained a large white clot in the right ventricle and a smaller one in the left. The liver and kidneys were healthy. The spleen weighed twelve ounces and adhered strongly to the diaphragm; in its substance beneath the adhesion was a cavity, partly divided by a partition extending to its bottom and containing about an ounce of viscid greenish fluid, [*Specimen* 523, Med. Sect., Army Medical Museum.] The stomach was inflamed and exhibited one ulcer about the middle of its greater curvature; the duodenum was congested; the jejunum injected in patches, its lower three feet healthy, as was the first foot of the ileum; the rest of the ileum ulcerated; the mesenteric glands inflamed; the large intestine healthy.—*Surg. W. L. Faron, 32d Mass., Depot Hospital, Fifth Army Corps, City Point, Va.*

Case 355.—Private Charles Hackett, Co. D, 129th Ind.; age 26; was admitted May 26, 1864, with pneumonia. When first seen by the reporter June 5, the patient was feeble, delirious and had diarrhœa with involuntary stools. He died June 10. *Post-mortem* examination: There were recent adhesions and a large serous effusion in the left pleural cavity; the upper lobe of the left lung was congested, the lower partially consolidated and coated with pseudo-membrane; the right lung was comparatively healthy. The heart was flabby and soft. The spleen was enlarged, congested and easily torn. The ileum was much inflamed and ulcerated in a number of places. The left kidney was slightly inflamed.—*Act. Ass't Surg. L. A. Walton, Hospital No. 8, Nashville, Tenn.*

Case 356.—Private Edwin Preston, Co. D, 5th N. Y. Cav.; age 20; was admitted Oct. 13, 1864, with typhoid pneumonia, and died on the 24th. *Post-mortem* examination twenty-four hours after death: Adhesion and almost complete consolidation of both lungs, which did not, however, sink in water; a band of lymph connecting the two surfaces of the pericardium; twelve ulcers in the ileum penetrating to the serous coat. Other organs normal.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

Case 357.—Private Meredith P. Osborn, Co. I, 9th Tenn. Cav., was admitted with typhoid pneumonia, and died Oct. 27, 1864. *Post-mortem* examination: The right lung was healthy; the left was in a state of gray hepatization with effusion of about one pint of serum in the pleural cavity. There was a large white clot in the right side of the heart. The liver was much congested; the ileum ulcerated; the mesenteric glands enlarged.—*Act. Ass't Surg. J. E. Brooks, Rock Island Hospital, Ill.*

Case 358.—Private William Walters, Co. I, 17th Ohio; age 34; was admitted Aug. 27, 1864, with typhoid pneumonia. He died September 4. *Post mortem* examination on the day of death: The lower lobe of the left lung was in the state of red hepatization. The heart, liver and kidneys were normal. The spleen was softened and enlarged; the lower portion of the ileum ulcerated in patches.—*Field Hospital, Chattanooga, Tenn.*

Case 359.—Private Ansel Fraley, Co. F, 33d Ohio; age 16; was admitted Aug. 21, 1864, with typhoid pneumonia, and died September 8. *Post mortem* examination, next day: Both lungs were congested and several lobules of the lower lobe of the right lung were hepatized. The mitral valve was thickened. The liver was somewhat softened;

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the spleen and kidneys normal. The mucous membrane of the lower portion of the ileum was deeply congested, softened and presented a number of ulcers.—*Field Hospital, Chattanooga, Tenn.*

Case 360.—Private Elcy Hall, Co. D, 3d Va. Cav.; age 17; was admitted Dec. 27, 1864, with pneumonia of the left lung, and died Jan. 6, 1865. *Post-mortem* examination twenty-four hours after death: About three ounces of liquid and some recent adhesions in each pleural cavity; lower lobe of each lung deeply congested and slightly hepatized. Heart and liver normal; spleen large and soft; kidneys congested. Peritoneal cavity containing about two pints of a turbid liquid; ileum above the ileo-cæcal valve presenting many deep and large ulcers, one of which had perforated the gut; colon slightly ulcerated.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

(g.) Diagnosis: Peritonitis.

Case 361.—Private William Riley, alias Cohen, Co. C, 14th Conn., was admitted Feb. 13, 1865, with peritonitis. Large doses of anodynes were given per rectum, the stomach being too irritable to retain anything. He died on the 17th. *Post-mortem* examination five hours after death: Peritoneum thickened and inflamed, containing twelve ounces of pale serum; small intestine adherent by bands of lymph; lower ileum showing many large, deep, irregular ulcers and containing three living lumbricoid worms; large intestine inflamed and in the rectum presenting ulcerated hemorrhoidal tumors; liver normal; spleen enlarged; kidneys small.—*Third Division Hospital, Alexandria, Va.*

(C.) Condition of Peyer's patches not stated; the intestinal mucous membrane not ulcerated—4 cases.

(a.) Diagnosis: Pneumonia.

Case 362.—Private Garrison North, Co. E, 5th Mich. Cav.; admitted March 25, 1863. Diagnosis—pneumonia. Died April 9 of typhoid fever. *Post-mortem* examination two hours after death: Brain forty-seven ounces. Right lung eighteen ounces, some pleuritic adhesions of upper lobe; left lung twenty-ounces, lower lobe much congested; bronchi of both lungs, especially of upper lobes, thickened and indurated, feeling on section like nodules. Heart thirteen ounces and a half. Liver eighty ounces, dark-purple, adherent to diaphragm, acini not well marked, capsule easily torn; two drachms and a half of pale bile, with white flakes, in gall-bladder; spleen fourteen ounces and a half, slate-colored externally, mulberry colored internally, softened. Stomach of a delicate pink color; duodenum and jejunum yellowish, mucous membrane tough; ileum pink, much congested, and solitary glands enlarged, especially in the lower part. Large intestine greenish at the cæcum and rather pale in other parts, with hyperæmic spots irregularly distributed over the surface; solitary glands dotted with black pigment.—*Ass't Surg. Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 363.—Elim Bess, Mo., guerilla; age 30; was admitted Nov. 2, 1864, with typhoid pneumonia: Tongue dry, slightly furred and red, bowels regular, pulse 100; he had no cough or expectoration, nor did he complain of pain or discomfort, but was so drowsy he could not be aroused to give his history; the lower lobe of his right lung was considered to be hepatized. During the last two or three days of life the bowels were tympanitic and tender. He died December 2. *Post-mortem* examination two hours after death: Lower lobe of right lung hepatized; spleen enlarged and softened; mesentery inflamed and glands much enlarged; solitary glands disorganized; bowels congested.—*Act. Ass't Surg. H. C. Newkirk, Rock Island Hospital, Ill.*

(b.) Diagnosis: Rheumatism.

Case 364.—Private Salem Brocket, 1st Kans. Bat'y; age 16; admitted June 9, 1864. A liniment of fluid extract of aconite, chloroform and tincture of camphor gave relief; but typhoid symptoms supervened, with cough, pain in the right side and expectoration of tenacious mucus; the stools were passed involuntarily. Pills of acetate of lead and opium were given with carbonate of ammonia and brandy. He failed gradually, became delirious and died on the 20th. *Post-mortem* examination: Lungs much congested, right partially adherent; pericardium containing two ounces of serum; liver and spleen enlarged; lower ileum inflamed; kidneys nearly double the normal size.—*Hospital No. 8, Nashville, Tenn.*

Case 365.—Private Aaron Dudley, Co. E, 31st Me.; age 31; was admitted June 6, 1864, with rheumatism, and died of typhoid fever August 8. *Post-mortem* examination twenty-four hours after death: Lungs congested posteriorly; liver normal; gall-bladder distended; kidneys much congested; spleen large and rather soft; intestines congested in spots; ileum near the ileo-cæcal valve much congested and presenting many ecchymoses; mesenteric glands very much enlarged.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

(D.) Peyer's patches variously stated, but not ulcerated—12 cases.

(a.) Peyer's patches healthy.

Diagnosis: Intermittent.

Case 366.—Private Francis Bleakley, Co. E, 6th Pa. Heavy Art.; age 24; was admitted Oct. 10, 1864, with intermittent fever. He died November 14 of typhoid fever. *Post-mortem* examination thirty hours after death: Emaciation; bedsores and suggillation posteriorly. Right lung normal anteriorly, congested and indurated posteriorly, splenified in a small portion of the lower lobe; left lung normal in its upper but congested in its lower lobe. Lower ileum congested in patches, but Peyer's patches were healthy. Kidneys slightly congested; pancreas, liver and spleen normal.—*Act. Ass't Surg. Thomas Bowen, Second Division Hospital, Alexandria, Va.*

Diagnosis: Peritonitis.

Case 367.—Private James Wynn, Co. D, 175th Pa.; admitted July 6, 1863, with fever and peritonitis. Died 7th. *Post-mortem* examination: Body not much emaciated. Lungs and heart healthy. Liver large and mottled, adherent to the diaphragm and intestines. The cavity of the abdomen contained much yellowish serum in which

flakes of yellowish lymph floated. The intestines were injected and interadherent by recent lymph; the mesenteric glands much enlarged and the mesentery thickened; the ileum was slightly injected and presented in its lower portion two perforating ulcers, one as large as a pea, the other the size of a ten-cent piece; Peyer's glands were free from disease.—*Act. Ass't Surg. Lloyd Dorsey, Harewood Hospital, Washington, D. C.*

(b.) Peyer's patches thickened and prominent.

Diagnosis: Pericarditis.

Case 368.—Hiram Bailey, colored; age 24; was admitted on the evening of Dec. 22, 1865, complaining of pain in the stomach and bowels. He came to hospital on foot without apparent difficulty. A dose of opium, with ginger and capsicum, was administered and he rested well during the night. Next day cathartic pills were given, with castor oil in the evening. On the 24th the patient had a copious stool, but in the meantime he had fallen into a lethargic condition; eyes open and staring; pulse 80, weak; skin natural; head cool; mucous râles heard over the large bronchi; chest resonant; no swelling or tenderness of the abdomen. Quinine was given freely and at short intervals, with mustard to the spine, feet and chest, but death took place on the morning of the 25th. *Post-mortem* examination six hours after death: The brain was normal. The right pleural sac contained ten ounces of serum; the lungs were normal but for the presence of a few scattered tubercles. The pericardium and heart were firmly adherent except at a small space where was an ounce of serum; the heart substance was normal. The liver and spleen were somewhat enlarged. In the ileum several of Peyer's patches were slightly elevated and quite dark, nearly black in color. The other abdominal viscera were normal.—*L'Ouverture Hospital, Alexandria, Va.*

Diagnosis: Pleurisy.

Case 369.—Private Charles A. Hoadley, Co. I, 3d Vt., was admitted Jan. 2, 1863, with pleurisy, and died on the 8th. *Post-mortem* examination thirty-six hours after death: The brain weighed forty-seven ounces. The right lung weighed fifty ounces; between its lobes was a deposit of yellowish semi-organized fibrinous lymph; posteriorly it was consolidated and in part hepatized, the consolidated portions being readily reduced to a pulp and exuding a reddish-gray puruloid matter. The left lung weighed fifty-two ounces; its lower lobe and the lower and posterior portions of its upper lobe were infiltrated with puruloid matter. The right auricle of the heart contained a fibrinous clot which extended through the ventricle into the pulmonary artery; the left cavities contained a black clot; about the middle of the thoracic aorta were some transverse yellow bands which were supposed to be atheromatous. The liver, sixty-nine ounces, was finely mottled and of a light reddish-brown color; the spleen, nine ounces, was light-colored, hardened in small portions and softened near the hilus, whence a thick reddish puruloid matter was readily pressed; the right kidney weighed seven ounces, the left six ounces and a half. The stomach was softened and congested; the jejunum was irregularly congested towards its termination; the ileum was very thin and there were spots of intense congestion in its middle third; Peyer's patches were enormously thickened, especially towards the cæcum.—*Ass't Surg. George M. McGill, U. S. A., Lincoln Hospital, Washington, D. C.*

Diagnosis: Pneumonia.

Case 370.—Private John Mosner, Co. B, 149th N. Y., was admitted Jan. 18, 1863, with typhoid pneumonia. The patient was very deaf and almost unconscious; his skin was hot and dry, respiration hurried, tongue dry and pulse 95; there was dulness on percussion and fine crepitation on the right side of the chest. He was ordered blue-pill, ipecacuanha and tartar emetic in small doses with dry cups to the chest. On the 22d the tongue became dryer, the pulse more rapid and the expectoration bloody and of a dark color. Stimulants and beef-essence were employed, with a blister to the right side, but they were unavailing; death took place on the 27th. *Post-mortem* examination four hours after death: Body finely developed. The brain weighed forty-nine ounces and a half. The right lung weighed thirty-two ounces and a quarter, the left twenty-eight and a half; the right lung was much congested, the lower part of its upper lobe in the state of gray hepatization and parts of its lower lobe in the state of red hepatization; the lobes of the left lung were interadherent, the lower congested and partly solidified; the bronchial glands were large, soft and black. The heart weighed nine ounces; there was much adipose tissue about the auriculo-ventricular rings; the cavities on both sides contained small clots. The liver weighed eighty ounces, its acini were distinct; the spleen weighed nine ounces and a half; the right kidney eight ounces, the left seven and three-quarters. The fundus of the stomach was extremely congested, as was the mucous membrane of the whole intestinal tract; in the lower part of the large intestine the congestion was so intense as to resemble ecchymosis; the glands of Peyer were large.—*Ass't Surg. George M. McGill, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 371.—Private John Beaton, Co. D, 1st Vt. Cav.; admitted Nov. 2, 1862, with typhoid pneumonia: Hot dry skin, pulse 85, compressible, tongue coated with brown fur, moderate diarrhœa, sudamina profusely distributed about the neck and thorax, gurgling and some tenderness in the right iliac region, dry cough, severe dyspnœa and almost complete aphonia; dulness on percussion and bronchial respiration over the lower portion of both lungs; no rose-colored spots. Treatment: Small doses of calomel, ipecacuanha and opium; dry cups and turpentine stupes to the chest; a mustard cataplasm to the abdomen. Died 5th. *Post-mortem* examination eighteen hours after death: The lower portion of both lungs was hepatized. The heart, stomach, spleen, liver, kidneys and large intestine were normal. The glands of Peyer were enlarged and inflamed.—*Third Division Hospital, Alexandria, Va.*

Case 372.—Private Charles Whitten, Co. K, 20th Me.; age 16; was admitted Nov. 18, 1862, with typhoid pneumonia. He complained of a dull pain below the right nipple; his pulse was frequent and feeble; his tongue covered with a white fur; skin hot and dry; bowels constipated. There was dulness on percussion over the right side, and crepitus was distinctly heard both anteriorly and posteriorly. Small doses of calomel, opium and ipecacuanha were given, with dry cups to the right side of the chest. In the progress of the case the cough became more troublesome

and the respiration hurried: diarrhœa supervened, accompanied by great tympanites of the abdomen; the tongue became dry and fissured and the lips and teeth covered with sordes. Stimulants were freely administered, but he died on the 29th. *Post-mortem* examination: The surface of the body was bluish from capillary congestion; the abdomen distended. The upper lobes of both lungs were congested and the lower lobes, with the middle lobe on the right side, hepatized; moderately firm. Pharynx purple, congested; tonsils yellow, enlarged to the size of an almond. Right lung twenty ounces, left seventeen and a half, congested; bronchial glands black. Heart eleven ounces and three-quarters; fibrinous clots in both sides extending into vessels. Liver sixty-eight ounces, light-colored, firm; gall bladder light-colored, containing seventeen drachms of watery bile; spleen seventeen ounces and a quarter, soft; left kidney seven ounces, intensely congested; pancreas three ounces and a half, dark-colored, slightly congested. Duodenum slightly congested, stained with bile, valvulæ thinned; jejunum light brownish-yellow, valvulæ thinned; ileum pale-yellow, solitary glands congested and enlarged in upper third; ileum thinned, solitary glands somewhat enlarged and Peyer's patches in upper third slightly congested; large intestine generally congested. Suprarenal capsules light-colored, soft, decidedly fatty; right kidney six ounces and a quarter, left six and three-quarters, somewhat congested.—*Asst. Surg. George M. Mowatt, U. S. A., Lincoln Hospital, Washington, D. C.*

Specimen 2 withheld.

Case 37.—Private Charles Chapman, Co. C, 24th N. Y. Cav., was admitted July 24, 1864. He was greatly emaciated, having suffered from diarrhœa for some time. The stools were frequent, quite watery, clay-colored and accompanied with griping pains in the abdomen; he had no appetite; his tongue was red and had marked elevations on the papillæ; pulse 100 and very weak. In a few days the passages became less frequent and of a dark-green color, but although thus improving he continued depressed in mind. On August 3 the right side of the face became much swollen and the gums swollen and red but not bleeding, the general appearance of the patient being scorbutic. Chlorate of potash was given internally and as a wash. Next day he had much difficulty in opening his mouth, and complained of sore throat; the fauces became much inflamed, the tonsils covered with pseudo-membrane, portions of which were expectorated, and mucous râles were developed in the chest. He died on the 6th. *Post-mortem* examination: Body very much emaciated. The larynx and fauces were covered with patches of false membrane. The right lung was slightly adherent: the left lung and heart normal. The liver was normal; the spleen enlarged four inches and a half by four inches; the right kidney was seven inches and a half long, its substance firm and healthy, the left kidney and suprarenal capsule were absent, their place being occupied by a closed cyst, one inch and a half long by one inch and a half in diameter, in which no fluid could be detected. Peyer's patches were much inflamed: the mesenteric glands healthy.—*Act. Ass't Surg. E. David, Fairfax Seminary Hospital, Va.*

Case 57.—Private Elias Zimmerman, Co. D, 48th Pa.: age 18: admitted July 24, 1864, from City Point hospital. The usual symptoms of typhoid fever were present. Peyer's patches inflamed: solitary follicles of ileum slightly ulcerated. Other organs normal.—*Act. Ass't Surg. G. W. Peer, Fairfax Seminary Hospital, Va.*

Case 176.—Private Franklin Dougherty, Co. D, 100th Pa.: age 18: admitted July 5, 1864, with chronic rheumatism and pneumonia. He was considerably emaciated, had anorexia and severe diarrhœa, with pulse weak and tongue coated in the centre with a thick gray fur; the left parotid was painful and much swollen. The parotid abscess was opened on the 15th and a small quantity of dark fetid pus was obtained; meanwhile the diarrhœa persisted and the patient seemed to be sinking gradually; he had a slight remission of fever in the forenoon of every day. In the progress of the case the integuments covering the parotid sloughed, delirium set in, at first slight at night but soon became more marked and the daily remissions less marked. He died on the 22d. *Post-mortem* examination six hours after death: Body greatly emaciated, rigor mortis well marked. Lungs much congested, but both sound. Liver slightly congested; gall-bladder distended with bile; spleen enlarged and pale; kidneys healthy. Stomach reddened in patches, which were more numerous near the pylorus; duodenum and jejunum normal. Peyer's glands congested slightly in the upper portion of the ileum and the solitary follicles in the lower portion considerably enlarged, many having incipient ulcers on their summits. Mucous membrane of the large intestine pale, softened and presenting several small ulcers in the cæcum and in the lower portion of the descending colon. Upper portion of left parotid gland exposed by sloughing of integument and superficial fascia; both were pale and softened a short distance down the side of the neck. [*Specimens* 385 to 390, Med. Sect., Army Medical Museum, are from this case.]—*Act. Ass't Surg. O. P. Sweet, Carver Hospital, Washington, D. C.*

No diagnosis: death from exhaustion.

Case 277.—Private Nicholas Sussman, Co. E, 39th Pa., was admitted Oct. 11, 1861, at noon. His pulse was weak and intermittent, breathing hurried, difficult and mainly abdominal; his extremities were cold and he complained of severe pain over the precordia and epigastrium. In the evening two wet cups were applied over each lung, after which he arose from bed and walked to the chair to stool: he expired as he sat down. *Post-mortem* examination ten hours after death: Body well developed and not emaciated; rigor mortis strongly marked. There were old pleuritic adhesions on the right side; the lower lobe of the lung was congested, the upper contained

tubercles; the left lung was healthy. The heart weighed twelve ounces and a half; fibrinous clots were found in the right ventricle, the walls of which were hypertrophied; the mitral valve was thickened and its right segment studded on the margin with roundish fibrinous bodies, some about the size of a pin-head, others as large as a pea. The liver was enlarged and fatty; the spleen was triple its normal size and mottled with spots surrounded by reddish areolæ, exuding on section a sero-purulent liquid; the kidneys were enlarged and fatty. Peyer's patches were inflamed and the mesenteric glands enlarged.—*Armory Square Hospital, Washington, D. C.*

Of the above seventy-nine cases, *forty-two* in which Peyer's patches were ulcerated, and *twenty-one* in which the ileum was ulcerated, may be set aside as being distinctly or probably cases of typhoid fever. In four, 362–365, of the remaining *sixteen* the intestinal lining was congested or inflamed. It is not stated that the membrane was *not* ulcerated or that Peyer's patches were *not* affected; for these *post-mortem* records seldom embody negative evidence in terms so positive. It must be inferred that if the membrane had been ulcerated the inquirer who noted its ecchymosed condition would have observed its ulceration, and that had the agminated glands been implicated the anatomist who took note of the enlarged, pigmented and disorganized condition of the solitary follicles would not have overlooked the condition of the others, particularly in cases in which typhoid fever was in question. Now, as there was no *post-mortem* evidence of typhoid fever in these cases, the change in the diagnosis must have been occasioned by the occurrence of typhoid symptoms, *i. e.*, in these cases typhoid symptoms were present although typhoid fever was not. Of the remaining twelve cases five, 368–372, presented appearances of the patches consistent with the theory of death at an early period of the progress of typhoid fever; but in the others the presence of that fever cannot be considered established: In 366 and 367 Peyer's glands were healthy. In 373–377 they are said to have been congested or inflamed, but this condition alone may not be accepted as pathognomonic of typhoid, since in 376 the ulceration of the solitary follicles, with which it was associated, while giving assurance that had the patches been ulcerated their condition would have been stated, indicates that the patient had lived long enough for this change to have taken place; indeed the prolonged duration of the fatal illness is sufficiently attested by the disorganization of the parotid glands. But for the congestion of the agminated glands the case of death from heart-clot, 377, would have found place in the malarial series in company with its cases 95 and 96.

In the absence of clinical histories it is impossible in many cases of the above series to say whether the change in the diagnosis was based on clinical or *post-mortem* considerations. It is certain, however, that in sixty-eight of the seventy-nine cases the *post-mortem* lesions authorized the change, while in eleven their testimony was less positive. In some of the latter clinical observation must have suggested the presence of typhoid fever, as the intestinal appearances were inadequate to sustain the diagnosis, but in others the presence of typhoid seems to have been based on a mistaken view of the import of these appearances.

A few cases illustrative of accidents in the course of typhoid fever or morbid conditions following it complete the *post-mortem* records of cases reported under this heading; but from the condition of the intestines in some of these cases it is doubtful if typhoid was the antecedent fever.

Case 378.—*Lumbricoid worm in larynx.*—Private Joseph Shuman, Co. M, 1st N. J. Cav.; age 17; was admitted Jan. 16, 1864, with typhoid fever. The patient was doing very well under tonics and stimulants when, on the 18th, he suddenly died asphyxiated. At the autopsy a lumbricoid worm nine inches long was found extending from the trachea into the right bronchus.—[See *specimen* 290, Med. Sect., Army Medical Museum.]—*Act. Ass't Surg. S. B. Ward, Third Division Hospital, Alexandria, Va.*

Case 379.—*Sudden death during convalescence; heart-clot; cerebral congestion.*—Private James F. Wilson, Co. C. 16th Me.; age 21; was admitted Feb. 8, 1865, convalescing from typhoid fever. He had a slight cough, but was

otherwise well and continued to gain strength until the 24th. At 3 A. M. on this day the nurse, in passing through the ward, found him awake, put the blankets over him and gave him some water to drink. He was then well. Three hours later he was found dead, having apparently died without a struggle. *Post-mortem* examination: No lividity about the face; pupils dilated; rigor mortis well marked on the right side, slight on the left. A considerable quantity of venous blood escaped on opening the cranium; some exudation was found on the arachnoid; the substance of the cerebrum and cerebellum was highly engorged, and bright blood welled up in unusual quantities when sections were made; the lateral ventricles were distended with a sero-sanguineous liquid. The lower lobe of the right lung was engorged. The right ventricle contained a large fibrinous clot. There were no other unusual appearances.—*Act. Ass't Surg. W. Kempster, Patterson Park Hospital, Baltimore, Md.*

CASE 380.—*Destructive inflammation of lungs.*—Private Richard H. Nelson, Co. A, 8th Mich., was admitted Dec. 30, 1862, with typhoid fever. On Jan. 24, 1863, he appeared to be convalescent and was walking about the ward, complaining occasionally, however, of pain in the right side of the chest. On February 18 he had headache, slight irritation of the fauces, constipation, difficulty of micturition and severe pain in the right side of the chest. He was ordered to bed, a laxative administered and warm fomentations applied to the chest. Next day, feeling better, he got up and went out of doors, after which the pain in the side returned and he began to cough and expectorate a muco-purulent matter. His cheeks were flushed, pulse 120, respiration 22; a friction sound with sibilant râles was heard over the lateral portion of the right lung; the respiratory murmur was absent in front. On the 22d he seemed much improved; the pain was not so severe; his appetite was good and bowels regular, but the expectoration remained copious. Two days later he had chills followed by fever and increasing prostration. He died March 8. *Post-mortem* examination twenty-eight hours after death: Body slightly rigid, not emaciated; apparent age 21 years. The brain was healthy. There was a white fibrinous clot in the right side of the heart extending into the pulmonary artery, and a small white clot with some dark blood in the left side. The right lung weighed thirty-four ounces and a half; it was congested generally and consolidated on the posterior and inner part of its lower lobe; its bronchial tubes, especially those proceeding from the consolidated portions, were somewhat congested and contained a puruloid matter; its anterior surface was coated with a thick layer of fibrinous lymph and the pleural sac contained sixteen ounces of pus. The left lung weighed twenty-seven ounces; portions of it were carnified; its bronchial tubes were congested and contained a purulent matter; the pleural cavity was sacculated and contained twenty-two ounces of straw-colored serum. The liver was firm, coarsely mottled, of a light reddish-brown externally and covered with numerous blood-spots; on section it was slate-colored; the gall-bladder was empty. The spleen, twenty ounces and three-quarters, was of firm consistence, dark-purple in color and with prominent trabeculæ; in its inferior border was a hard nodule about the size of a hazel-nut. The pancreas was firm and of a light-straw color. The kidneys were of a purplish-slate color; the suprarenal capsules firm, large and of a reddish-ash color. The mesenteric glands were much enlarged. The stomach was softened and congested along the longitudinal folds and in the lesser curvature; the duodenum and jejunum were irregularly congested; the ileum decidedly congested; Peyer's patches apparently healthy; the solitary glands slightly enlarged and congested. The ascending colon and cæcum were dilated, their mucous membrane thin and soft; the transverse colon was somewhat contracted and covered with black specks; the sigmoid flexure congested; the rectum normal.—*Ass't Surg. George M. McGill, U. S. A., Lincoln Hospital, Washington, D. C.*

CASE 381.—*Inflammation of the parotid; paralysis and hyperæsthesia of the limbs.*—Private John Parker, Co. B, 3d Ohio Cav., was admitted March 4, 1864, as a convalescent from typhoid fever. His tongue was very much coated and the parotid gland was slightly swollen. In a few days the swelling had almost disappeared but he continued feeble, lost the use of his arms and legs and complained when they were touched: this sensitiveness was especially marked in the right arm and left leg. Diarrhœa set in on the 11th, when his tongue became dry and pulse small: death took place on the 13th. *Post-mortem* examination eighteen hours after death: Body not much emaciated. The lungs, heart, stomach and intestines appeared to be healthy. The liver was pale, much enlarged, and showed evidence of a local peritonitis: its right lobe was congested: the gall-bladder was empty. Both kidneys were much congested.—*Act. Ass't Surg. L. A. Walton, Hospital No. 8, Nashville, Tenn.*

CASE 382.—*Psoas abscess.*—Private S. E. Robinson, Co. A, 3d Md.; age 26; was admitted from Patterson Park hospital Sept. 21, 1864, as a convalescent from typhoid fever. On the 28th he had a chill and two days later there was pain in the upper part of the right thigh, where redness, swelling and fluctuation were observed. On October 1 flatus and fæcal matter were brought away by an exploring needle, and the case was regarded as one of typhlitis with perforation and adhesion of the bowel to the abdominal walls. A free incision was made and a considerable quantity of pus escaped mixed with fecal matter. The patient became delirious on the 4th and had obstinate hiccough. He died on the 6th, after having been unconscious for thirty-six hours. *Post-mortem* examination: A large psoas abscess had dissected the muscles of the thigh as far as the middle third. "No perforation of the bowel was discovered, so that what was supposed to have been fæcal matter must have been altered pus. It is but right, however, to state that several medical men present at the time concurred in the opinion then formed." [The condition of the mucous membrane of the intestine was not recorded.]—*Mower Hospital, Philadelphia, Pa.*

CASE 383.—*Purulent collections.*—Private J. W. Cunningham, Co. I, 176th Ohio; age 26; was admitted from hospital, Frederick, Md., Aug. 7, 1864; diarrhœa following typhoid fever. He died September 8. *Post-mortem* examination twenty-four hours after death: Abscesses were found under the right arm, on the anterior aspect of the right forearm and on the dorsum of the left foot. Both lungs contained abscesses; the lower lobe of the left lung was one immense cavity which had opened into the pleural sac, filling its lower half with pus, but adhesions of the parietal and pulmonary pleuræ around the upper part of the lobe separated this purulent collection from the upper half of the pleura: on the right side the abscess under the arm communicated freely with the pleural cavity, which

was filled with pus. The pericardium was distended with serum. The liver was normal: the gall-blader distended —*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

CASE 384.—*Diphtheria and inflammation of the submaxillary gland.*—Private Charles Williams, Co. F, 52d Pa.; age 21: was admitted Sept. 22, 1864, with typhoid pneumonia. He was recovering from an attack of typhoid fever and was thin and broken down; his skin presented a peculiar bronzed appearance in spots, from which the epidermis was easily peeled off, leaving an abnormally white surface beneath; he suffered considerably from diarrhœa. There was dulness on percussion and an absence of the respiratory murmur over the base of the right lung, with slight nocturnal cough. His condition did not change much until the middle of November, when he had an attack of diphtheria, followed, after a few days, by inflammation of the left submaxillary gland, which suppurated and was opened about December 1. On the 6th he complained of cough, difficult expectoration and constant pain through the lower part of both lungs, with occasional paroxysms of pain of a more lancinating character. There was dulness on percussion and bronchitic râles at the base of both lungs with friction sounds superadded; these signs afterwards gave place to blowing respiration with entire absence of the vesicular murmur, and finally to loose mucous and submucous râles. He died December 24. *Post-mortem* examination: Both lungs were bound to the thoracic parietes by extensive and firm adhesions; the lower portion of each lung was in a state of gray hepatization. [There is no record of the condition of the intestinal mucous membrane.]—*Cuyler Hospital, Philadelphia, Pa.*

Of the fevers reported as typhus the records furnish but five cases in which the *post-mortem* appearances are described. In one of these, 385, extensive disease of the agminated glands sufficiently indicates its typhoid character. Case 386 appears to have been an example of pernicious malarial fever, for although the disease had lasted some time, most of the patches were healthy, a few only being inflamed and somewhat thickened and none ulcerated, while the large intestine was ecchymosed and ulcerated. Case 387, with its prominent and pigmented solitary glands, was apparently of a similar nature. Many cases presenting intestinal lesions of this character have already been noted as referable to the malarial rather than to the typhoid influence. From the necroscopic appearances 388 seems related to the suddenly fatal cases which were reported as cerebro-spinal meningitis.* Case 389 is the only instance in which the *post-mortem* lesions, so far as determined, were consistent with the diagnosis, and as the case occurred in the city of Philadelphia, it is probable that it is the representative of that veritable typhus which occurred among soldiers exposed to circumscribed foci of infection during a temporary residence in the large cities.

CASE 385.—Private Burton White, Co. E, 147th N. Y., was admitted April 22, 1863, with an incised wound of the right leg. He died May 26, of pneumonia supervening on an obscure disease resembling typhus. *Post-mortem* examination: Body plump and full; depending parts dark-colored. The adjoining halves of the lower and middle lobes of the right lung were infiltrated with pus. The lower part of the ileum was extensively ulcerated in patches, in one of which was a small perforation closed by adhesion to the peritoneum covering the bladder; there had been no escape of intestinal contents and there was no indication of peritonitis. The spleen and the mesenteric glands were enlarged and softened. [*Specimens* 180 to 183, Med. Sect., Army Medical Museum, are from this case: see also plate facing this page.]—*Surg. Thomas R. Crosby, U. S. V., Columbian Hospital, Washington, D. C.*

CASE 386.—Private Charles B. Dorr, Co. B, 17th U. S. Inf.; admitted Aug. 10, 1862, from the Army of the Potomac. Typhus fever. Died 22d. *Post-mortem* examination: Age about 22 years; body moderately emaciated and with diffused ecchymoses on the skin of the trunk; the muscles were of their ordinary character, but the viscera of the chest and abdomen were generally softer than usual. The lungs and heart were normal except that there were two ecchymosed spots about a quarter of an inch in diameter near the base of the latter. The blood presented nothing unusual. The liver and spleen were natural. The mucous membrane of the stomach was inflamed near the pylorus and presented a number of small ulcers, about a line in diameter, along the lesser curvature. [*Specimen* 272, Med. Sect., Army Medical Museum.] The ileum was inflamed in patches, some of which were intensely affected; the solitary glands were enlarged and inflamed; most of the agminated glands were healthy, some were inflamed and slightly thickened, but none were ulcerated. [*Specimens* 273–276.] The mucous membrane of the colon was more or less slate-colored, with patches of inflammation, a number of ecchymoses about half an inch in diameter, and in the descending portion a number of stellate, blackened ulcers.—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

CASE 387.—Private John Mills, Co. C, 43d N. Y.; vigorous looking, but somewhat emaciated; admitted Aug. 10, 1862. Died 14th. [Case supposed by Dr. ATLEE, the attending physician, to be typhus.] *Post-mortem* examination next day: The skin of the front and sides of the chest and abdomen was slightly ecchymosed. The lower lobe of the left lung was affected with recent pleuro-pneumonia; the upper lobe was inflamed; the right lung was somewhat congested. The heart, stomach and spleen were natural, and the liver exhibited a healthy color and texture, but presented an unusually lobular appearance (as in the rat). The mucous membrane of the small intestine was of

* See *infra*, p. 552 *et seq.*

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a pinkish-cream color and tinged with bile; the solitary glands of the jejunum were opaque-white and those of the ileum unusually prominent and dotted with black pigment; the agminated glands were slightly thicker than usual but did not appear positively diseased. The colon was much contracted and its mucous membrane slightly inflamed; the solitary glands were large and prominent, especially in the cæcum, and were marked by a deposit of black pigment.—*Act. Ass't Surg. J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

CASE 388.—Jeremiah Saulsburg, a colored soldier, died of typhus Jan. 24, 1864. *Post-mortem* examination eight hours after death: Body stout and well developed. There were well-marked deposits of viscid pus between the convolutions of the frontal lobes and of the parietal lobes near the longitudinal fissure, as also over the pons medulla and crura; a mass of pus overlaid the anterior corpora quadrigemina, and the membrane covering them was finely injected; the substance of the brain was gorged with blood, but the choroid plexus was pale and the ventricles not enlarged although containing some effusion. The pericardium was full of serum and the right cavities of the heart contained fibrinous clots. The lower lobe of the left lung was congested by hypostasis, but there were also some spots of proper hepatization. The liver was darker than usual and full of blood. The colon and ileum were inflated. (There had been strabismus during the last three or four days of this patient's life.)—*Act. Ass't Surg. W. C. Minor, Knight General Hospital.*

CASE 389.—Private William W. Fenno, Co. K, 145th Pa.; age 19; was admitted Dec. 13, 1862, with chronic rheumatism and debility, and so far recovered as to be able for guard duty; but on Feb. 17, 1863, he was taken with diarrhœa and next day he had a high fever, quick breathing, tremulous voice and a dark furred tongue. 19th: Diagnosis—typhus fever; dyspnœa greatly increased; diarrhœa almost ceased; stupid, but could be aroused by a loud voice; abdomen tympanitic; capillary circulation feeble; no eruption. 20th: Suppression of urine. 1.30 P. M., vomited a large lumbricoid worm and other matters; restless delirium alternating with comatose quiet. Died at 4 P. M. *Post-mortem* examination: Suggillation distinct; no vibices; petechiæ over epigastrium, stated by the nurse to have existed during life. Brain not examined. Lungs congested posteriorly. Left ventricle of heart filled with black fluid blood; right containing two fibrinous clots. Liver large but healthy; spleen much enlarged and lobulated; kidneys and intestines healthy.—*Cuyler Hospital, Philadelphia, Pa.*

V.—ON THE PATHOLOGICAL ANATOMY AND PATHOLOGY OF THE CONTINUED FEVERS.

I.—THE CASES AND THEIR ANALYSIS.

Three hundred and eighty-nine cases from the *post-mortem* records have been submitted. These were regarded by the medical officers in attendance as fatal instances of continued fever. They have been presented as—

1st. *Fifty* cases, 1–50, presumed from their symptoms to have been unmodified typhoid;

2d. *Sixty-six* cases, 51–116, of an adynamic continued fever, which might from the symptoms or diagnosis have been individually either cases of modified typhoid or of adynamic malarial fever;

3d. *Two hundred and sixty-eight* cases, 117–384, of fever which, although reported as typhoid, might individually have been typhoid, typho-malarial or adynamic malarial, in view of the uncertainty attaching to the diagnosis;

4th. *Five* cases, 385–389, reported as typhus, but which, in like manner, might have been due to other pernicious causes than the typhus or the typhoid poison.

The study of the intestinal lesions, as conducted in the last section, has modified ante-mortem views as to the relationship of these cases one to the other, and rendered a rearrangement advisable to facilitate further investigation into their pathological anatomy. The diagnosis of the fifty cases presumed to be unmodified typhoid was confirmed by the evidence of the agminated glands or by such conditions of the ileum as were suggestive of a glandular involvement. The sixty-six continued febrile cases of an adynamic or typhoid type consisted of *forty-six* in which the lesions of typhoid were associated with malarial symptoms and of *twenty* in which the absence of these lesions indicated the malarial influence as the sole cause of the morbid phenomena. The two hundred and sixty-eight cases of reported typhoid comprised *fifteen* cases in which the *post-mortem* appearances testified that some febrile cause, which from its symptoms was of a malarial nature, had preceded the onset of a typhoid attack, *forty-one* in which typhoid lesions were not discovered,

and *two hundred and twelve* in which these lesions were present or such ulceration of the small intestine as might be attributed to either typhoid fever alone or to typhoid as modified by the concurrence of malarial fever, thus constituting a mixed series of typhoid and typho-malarial cases. The five cases reported as typhus were similarly found to consist of one typhoid case, two malarial cases, one case related to cerebro-spinal fever and one of probably true typhus.

Aggregating these in accordance with clinical history, diagnosis and intestinal lesions, there appear—

Fifty cases of unmodified typhoid, cases 1–50;

Sixty-three cases of malarial fever with typhoid or adynamic symptoms but without typhoid lesions, cases 70–73, 76, 78–81, 84, 87–91, 104, 105, 108, 113, 115, 246–252, 254–263, 274, 276–278, 287–295, 362–367, 373–377, 386 and 387;*

Sixty-one cases of true typho-malarial fever, cases 51–69, 74, 75, 77, 82, 83, 85, 86, 92–103, 106, 107, 109–112, 114, 116, 264–273, 280, 285 and 296–298;†

Two hundred and thirteen cases of a mixed class, consisting chiefly of typho-malarial fever, but probably containing some instances of typhoid alone and of malarial fever alone, cases 117–245, 253, 275, 279, 281–284, 286, 299–361, 368–372, 378–384 and 385;

One case of cerebro-spinal fever, (?) case 388;

One case of typhus, (?) case 389.

The results of an analysis of the *post-mortem* appearances in these cases is herewith submitted; and, to admit of a comparison between the anatomical details of the typhoid cases of the war and those of civil life, a summary of the lesions in the cases so carefully observed by Louis is given below.‡

Analysis of the Post-mortem Appearances.

The Salivary Glands.—In but one of the continued febrile cases was mention made of an inflamed condition of the submaxillary or sublingual glands, but a destructive inflammation occurred with some frequency in the parotid region. It was present in sixteen of the recorded cases; in six the glands were swollen and indurated and in ten destroyed by suppuration. In three cases the morbid action affected both sides, while in thirteen it was confined to one side; the right gland was involved in five cases, the left in three; in five the record does not specify the side.

Parotid abscess occurred in but one case, 31, of the fifty *typhoid* cases; one side only was affected. In 258 of the *malarial* series the right parotid was swollen, and in three cases abscess was formed,—on the right side in 251, on the left in 376 and on both sides in 263. Parotitis occurred in four of the *typho-malarial* series: In 53 on one side and in 65 and 97 on the right side; suppuration was present on one side, in 103. In the *mixed* series of cases swelling existed in two cases and suppuration in five: The swelling in 118 and 381 does not appear to have culminated in abscess; the right gland suppurated in 125; the left in 193 and 338, and both glands in 222 and 348. Suppuration occurred in the submaxillary glands in case 384 of this series.

The condition of the pharynx and œsophagus appears to have been seldom observed by our medical officers. The mucous membrane was reported pale in case 23 of the *typhoid* series. It presented morbid appearances in six of the *malarial* cases,—purplish coloration in 90 and 277, deep congestion in 373, erosion without accompanying con-

*To these might with propriety be added certain cases reported as typho-malarial fever by the attending officers, but submitted in the second part of this work as cases of diarrhœa and dysentery. Thus, in case 313, entered as typho-malarial fever, the small intestine was found healthy; in 363, reported as typhoid-remittent fever, the duodenum was of a dark-purple color, but the remainder of the small intestine was healthy except near the valve, where were many small circular superficial ulcers, the solitary glands being prominent and the patches of Peyer pale but neither ulcerated nor elevated; in 518, reported typho-malarial, the mucous membrane of the ileum was somewhat inflamed; in 832, at first regarded as remittent fever and afterwards as typhoid dysentery, the ileum was congested and studded with small ulcerations, while the large intestine was more extensively ulcerated and almost gangrenous. Perhaps also case 783 should be added to these, as the patient had an adynamic fever from the time he entered the hospital, yet *post-mortem* investigation showed the small intestine to be in a healthy condition. In fact many cases of the diarrhœal series, in which the typhoid lesion was not found after death, presented more or less of a clinical resemblance to typhoid fever.

†To these might be added the case submitted in the second part of this work as 825 of the diarrhœal series; the diagnosis was typho-malarial fever, and *post-mortem* examination revealed the ileum and colon studded with ulceration. Perhaps 436, presenting fever of an adynamic type, with hemorrhage from the bowels, and showing at the autopsy the small intestine ulcerated in patches and the large intestine perforated, may also have been a true typho-malarial case. For a discussion of the connection between the diarrhœal cases and the continued fevers, see *infra*, p. 615 *et seq.*

‡The following abstract of the *post-mortem* appearances found by Louis in his forty-six cases may be of interest in connection with the lesions observed in the fifty typhoid cases of the text:

The salivary glands.—The submaxillary and sublingual glands were not altered in any of the cases; but in two there was suppuration in the parotid region, due in one instance to inflammation of the surrounding cellular tissue and in the other to inflammation of the glandular structure.

The pharynx was affected in eight cases; ulcerated in six and covered with false membranes associated with purulent infiltration of the submucous cellular tissue in two. The ulcerations were few, three to eight lines in their greatest, the vertical, diameter and situated on the lower and lateral aspects of the sac. As no such ulceration was found in seventy cases of other acute diseases, Louis considered it an important lesion and one of the secondary anatomical characteristics of the typhoid affection.

The œsophagus was ulcerated in seven cases, only two of which were included among those having the pharynx affected. The ulcers, when few, were situated near the cardia, when numerous they extended throughout the whole of the tube, but were more frequent and larger towards the lower end. Louis associated these ulcers with those of the pharynx as peculiar to typhoid fever.

gestion in 259, softening and denudation in 71, and diphtheritic exudation in 374. In the *typho-malarial* series a morbid condition is mentioned in but three instances: In 65 the mucous membrane was inflamed; in 54 inflamed and ulcerated; in 67 abscesses were found on the left side in front of the hyoid bone. In the *mixed* series morbid appearances were noted in twelve instances: The œsophageal lining was of a pale color and ulcerated in its lower part in 137 and 187, while in the same region in 301 it presented dark-colored spots, one of which was eroded; it was congested in longitudinal streaks in 305; inflamed, purplish, and in its lower part ecchymosed in 329; in 156 the œsophagus was of a purple or brown color and its walls contained an abscess as large as a chestnut, and in 185 there was an ulceration on its posterior wall on a level with the larynx, while the tube below was filled with a whitish exudation; in 155, 199 and 304 the mucous membrane was yellowish and in 183 purple; in 338 the pharyngeal coats were perforated by matter from the parotid region.

The STOMACH was normal in four of the *typhoid* cases, 11, 27, 35 and 36, and in one, 16, it was not examined. Of twelve cases in which a morbid change was reported its mucous membrane in 24, 26, 29, 41 and 47 was reddened from congestion; in 9 the congestion was in circumscribed patches; in 8 the fundus, which was of a dull-red color, contained five lumbricoid worms; in 21 the mucous membrane was pale and thickened; in 22 slaty and mottled; in 23 mottled, congested and blackened from pigmentary deposits near the pylorus; in 48 thickened and softened, and in 31 thickened and congested, the viscus containing about a pint of an offensive yellow liquid. Of the sixty-three *malarial* cases the condition of the stomach was not stated in thirty-four, and in the remaining twenty-nine it was normal in fourteen, congested in six, thickened and softened in three, inflamed on its peritoneal surface in 249 and along the great curvature in 91; ulcerated along the small curvature in 386; flaccid, thin and greatly discolored in 287; ecchymosed but uncongested in 262, and in 71 the organ contained a pint of dark-colored liquid in which floated shreds of its disintegrated mucous membrane. Of the *typho-malarial* series the condition of the stomach was mentioned in sixteen cases: It was normal in six, congested in two, 103 and 296; softened in two, 98 and 112, in the former of which the lining membrane was almost disintegrated; in 93 it was unusually corrugated; in 65 and 116 inflamed; in 96 it presented black patches and was ulcerated near the pylorus; in 62 it was filled with dark grumous blood, and in 106, in which death resulted from peritonitis, it contained fæcal matter. In the *mixed* series of cases the state of the stomach was mentioned seventy-four times: In thirty-three it was normal, but in one of these, 325, it contained a grumous liquid; in four it was merely distended. Of the remaining thirty-seven cases its mucous membrane was congested and more or less softened in sixteen; softened in four, to pultaceousness in 243; injected in five; inflamed in six, in one of which, 354, there was ulceration, and in another, 239, the viscus contained matter like coffee-grounds; grayish, slate-colored or marbled in three; ecchymosed in one, 342; in 191 the stomach was filled with bile and in 156 with a liquid of a greenish color and fæcal-like odor.

The DUODENUM was distended in case 5 of the *typhoid* series, normal in 26, filled with thick tenacious mucus in 23 and undergoing putrefactive changes in 22; its mucous membrane was congested or inflamed in 17, 18, 29 and 50, softened and thickened in 48; in 41 its glands were enlarged and in 9 congested. Morbid changes were defined in four of the *malarial* series: In 87 the glands of Brünner were enlarged; in 276 and 373 the lining membrane was congested and in 71 disintegrated; but in other instances, as 81, 113 and 259, a congested or inflamed condition of the duodenum may be inferred. Ten observations were recorded in precise terms or by inference in the *typho-malarial* series: In four a normal condition was indicated; in 269 the glands were enlarged; in 53 there was follicular inflammation with softening; in 86 the lining membrane was dark-colored and congested; in 65 and 116 inflamed and in 96 ulcerated. Twenty-six observations were noted in the *mixed* series of cases: In ten a healthy condition was stated; in four the glands alone were mentioned, enlarged in 122 and 281, inflamed in 284 and ulcerated in 307; in nine, 181, 182, 190, 279, 317, 318, 354, 370 and 380 the mucous membrane was congested; in one, 243, pultaceous; and in two, 156 and 338, dark-colored.

The JEJUNUM was distended in case 5 of the *typhoid* series; normal in 10 and 26 and probably also in 23. In 17, 18, 29, 47 and 50 it was more or less congested; its mucous membrane was softened in 8 and 48 and white, inelastic and easily torn in 22. Its condition was altered in seven of the *malarial* cases: In 30 its calibre was contracted and its mucous membrane pale; in 247, 259, 260, 276 and 278 there was more or less of congestion or inflammation, in some general, in others affecting the lower portion only; in 274 the mucous membrane was softened and velvety. It was mentioned as normal in six cases. Eleven observations were made in the *typho-malarial* cases: In five the jejunum was normal; it was congested in 86 and 95; softened in 53; inflamed in 65; ulcerated in 269 and slate-colored in 172. In many of the *mixed* series a healthy condition of the jejunum may be inferred; in others, as 171, 174, 180, 195, 196, 219, etc., the inflammation which affected the ileum appears to have extended upward. But in forty-two instances its condition is specified in precise terms: In seventeen of these it was normal; in fourteen, 141, 187, 189, 279, 281, 282, 300, 306, 314, 321, 354, 369, 370 and 380, congested; in three, 191, 323 and 339, softened; in seven, 165, 239, 284, 309, 318, 337 and 353, ulcerated, and in one, 338, lead-colored. It was normal in 181, although the duodenum and ileum were implicated, and in 241, notwithstanding the existence of an intussusception; in 354 its lower part only was congested; in 239 and 282, respectively ulcerated and congested, there were lumbricoid worms.

INTUSSUSCEPTION OF THE SMALL INTESTINE was not recorded as having been observed in any of the *typhoid* or

The stomach was healthy in thirteen cases and in the others more or less altered by hyperæmic conditions; in four there were small ulcerations [illegible] similar changes, and in nearly the same proportion, were found in seventy-two patients who died of other diseases.

The duodenum.—The notes on the condition of this portion of the alimentary canal are restricted to twenty-two cases, in eight of which it was [illegible]. Of the remaining fourteen the mucous membrane was red in four, the redness being diffused or circumscribed; grayish in two; soft in three, [illegible] was also red; Brünner's glands were much enlarged near the pyloric end in three, two of which had the mucous membrane softened and [illegible] near the valve. With the exception of the ulceration similar conditions were found in thirty-six cases of death from [illegible].

Intussusception of the small intestine was found in three cases.

typho-malarial cases; but it was noted in 88 and 258 of the *malarial* series, and in five cases, 127, 130, 222, 234 and 241, of the *mixed* series of febrile cases.

LUMBRICOID WORMS were noted in cases 6 and 8 of the *typhoid*, in 239, 282, 348, 361 and 378 of the *mixed* series, and in the *typhus* case 389. Their presence was not observed or recorded in any of the *malarial* or *typho-malarial* cases.

The PATCHES OF PEYER were ulcerated in thirty-three of the fifty *typhoid* cases, while in seventeen their condition was not stated; but, as will be seen in referring to the occurrence of perforation, the ulceration of the intestine in the latter cases was of the same circumscribed and penetrating character as that definitely stated in the former as having its site in the patches. Since all febrile cases presenting adynamic symptoms have been in this volume classified as typhoid when *post-mortem* examination revealed in them a tumefied or ulcerated condition of the patches, it necessarily follows that in the sixty-three cases submitted as examples of *malarial* fever the agminated glands were not found to be thus affected. Their condition was not stated in twenty-six cases; they were healthy in seven cases, 257–261, 366 and 367, and reported not ulcerated in 262 and 263; in the remaining twenty-eight cases they were pale, white, reddened, congested or pigmented. Their condition was not stated in ten of the sixty-one *typho-malarial* cases; they were enlarged, congested, inflamed or pigmented in twenty-one cases and ulcerated in thirty. Of the two hundred and thirteen *mixed* cases their condition was not reported in sixty-eight. They were ulcerated in one hundred and thirty-one and tumid and inflamed in twelve; they were healthy in one, 380, and indirectly stated to have been so in one, 379,—in the former death occurred from pneumonia six weeks after the patient had so far convalesced from his typhoid attack as to be able to walk about the ward; in the latter, as the object of the *post-mortem* examination seems to have been an explanation of sudden and unexpected death during convalescence, the appearances presented by the agminated glands were not referred to except in so far as they may be included in the general statement that there were no other unusual appearances than those recorded as having been observed in the brain, heart and lungs.

The condition of the MUCOUS MEMBRANE OF THE ILEUM, in the intervals between the ulcerated patches, was not stated in twenty-two of the fifty *typhoid* cases. What may have been its condition in these instances is uncertain. If credit be given to the records as well for what is not said as for what is stated, the mucous membrane presented no morbid appearance of note beyond its destruction over the site of the affected glands. But such negative evidence is of doubtful value, and has not heretofore been admitted in these analytical observations. Nevertheless, it seems probable that in at least some of these cases there was no general congestion of the membrane, for, as will be seen immediately, congestion when present in other cases was confined to the vicinity of the affected patches, and in cases 23 and 48 the bases of the ulcers are said to have been of a reddish color, which distinction could not well have been made had the general lining of the intestine, including the part surrounding the ulcers, been in a highly injected condition. In twenty-five cases the ileum was reported congested, but in nine of these, 8, 9, 16, 26, 30, 34, 39, 40 and 46, the congestion was confined to the lower part of the intestine or to that part in which the destruction of the patches was greatest, and in many of those in which a general congestion is intimated it was more intense at this part than higher up, where the disease of the patches was less advanced. The mucous membrane was softened in two cases, 15 and 29, and of a dull whitish color in one case, 22. In 5 the ileum was contracted and in 27 it contained a frothy semi-liquid sanguinolent matter.

LUMBRICOID WORMS were noted in two cases; but this does not express the frequency of their presence, for some instances of their passage from the body during life and others of their detection after death were not recorded.

The PATCHES OF PEYER were altered in structure in the lower 2–8 feet of the small intestine in all the cases; in the whole length of the canal in one case only. Those nearest the cæcum were most altered, those farthest from it least altered; whence it is inferred that the morbid process did not commence simultaneously in all the patches, but was progressive in an upward direction, and that the changes to which an individual plaque is subject may be appreciated by a study of the various patches from above downwards. They were at first slightly elevated and of a pale-rose color, the elevation being due to a hyperplasia of the parts or an exaggeration of the normal structure. Afterwards they became redder, thicker, larger, softer and adherent to the submucous tissue, which was reddened and thickened beneath them. Then ulceration took place, or a process of absorption without ulceration. The destruction of the mucous membrane covering a patch was due to the union of many ulcerative points or to the extension of one; hence the ulcerations differed from each other considerably in appearance. Their outline was generally regular, oval or rounded, but sometimes angular; in some the edges were perpendicular, in others they sloped gradually into the central and deeper parts of the ulcer; the muscular coat was exposed in some, and in a certain number the serous coat was perforated. On the establishment of recuperative action the red color became tinged with gray or blue, and a thin cicatricial pellicle was developed from the surrounding mucous surface. In those that had not undergone ulceration a similar change in color was accompanied by a diminution of the tumefaction and softness. LOUIS gave the name of soft patches (*plaques molles*) to the agminated glands when affected as has been described, applying the term hard patches (*plaques dures*) to them when, superadded to the conditions present in the soft patches, there was a transformation of the submucosa by an interstitial exudation of a homogeneous, unorganized and more or less friable substance of a faint rose or yellowish color which attained a thickness of two or three lines. When the mucous membrane over these plates was unbroken they had a smooth uniform appearance; but when ulcerated their appearance was uneven, furrowed and stained with bile. This substance was also formed beneath some of the irregular patches intervening between the patches of Peyer, and in some cases it appeared in the form of prominences two or three lines in diameter and of equal height. These hard patches were found in thirteen of the forty-six cases, in ten of which they alone constituted the local lesion, while in three they were associated with the plaques molles. The SOLITARY GLANDS of the small intestine were affected in twelve cases, but generally only within a few feet of the cæcum. They were flattened and white or rounded and of a grayish color. In one instance they had a grayish point in their centres; in three others they were ulcerated. LOUIS considered it doubtful if all the small white elevations present in some of the cases were really enlarged crypts. Setting aside the condition of the patches of Peyer, these changes in the small intestine, the result of congestive or inflammatory processes in its mucous membrane, were found in other acute diseases and in nearly the same proportion as in typhoid fever. Even the changes in the solitary glands may not be excepted, as in five cases, three of which were cases of scarlet fever, those near the cæcum were enlarged and reddened. Hence these morbid changes, like those affecting the stomach, were considered by LOUIS as the result of a continuance of febrile action on the system. But as the affection of the agminated glands was not found in any other disease it was conceived to be the primary and pathognomonic lesion of typhoid fever.

In seventeen cases the mucous membrane of the JEJUNUM and ILEUM preserved its natural color, white or yellow from a tinge of bile, throughout nearly their whole length; in sixteen it was red, and while in six of these the redness extended throughout the length of the tube, in ten it was confined to the lower half or third; in thirteen patients in whom death took place late in the attack the membrane was of a grayish color. Of forty-two cases the mucous lining was of normal consistence in nine, softened throughout in thirteen and in its lower portion only in twenty.

Of the sixty-three *malarial* cases the condition of the mucous membrane of the ileum was not stated in eight: congested in patches in thirteen: generally injected or inflamed in thirty-two, and variously stated in ten. Of the thirteen in which the injection was circumscribed in patches the lower part of the ileum was chiefly affected in three, 115, 292 and 366, the upper part in one, 259, while in nine a general distribution of the patches throughout the ileum is indicated: In 247 these localized congestions were extensive; in 248 scattered; in 287, 293 and 386 intensely affected, and in 91 and 365 ecchymosed: in 84 and 261 the agminated glands were not diseased notwithstanding the existence of these inflamed patches. Of the thirty-two cases in which the congestion of the membrane was general throughout the ileum it is expressly stated in some, as in 105, 256 and 263, that no ulceration was present: in 367 the intestine was perforated by ulceration, but the patches of Peyer were not involved. Of the ten cases in which the condition of the membrane was variously reported it was thinned in 373: thinned and reddened in 274 and 276; of a pinkish-cream color in 387; softened in 78; thickened and softened in 87; gangrenous in 80; and free from congestion or other lesion than pigmentary deposits in the closed glands in 90, 290 and 291. In the eight cases, 70, 108, 277, 289, 374–377, in which the condition of the mucous membrane was not stated, it is probable that there was no marked congestion, for in several, as in the pyæmic case, 289, the attention of the operator was certainly directed to this part of the intestinal canal, since the condition of its closed glands was observed and recorded. Moreover, as has been already shown, the *post-mortem* appearances in the paroxysmal fevers do not necessarily include congestion or inflammation of the lining membrane of the small intestine.

Of the sixty-one *typho-malarial* cases the condition of the ileum, exclusive of its glands, was not stated in thirty-three. It was more or less congested or inflamed in twenty-four; but in three of these, 63, 68 and 96, the morbid condition was confined to the neighborhood of the ileo-cæcal valve; in one, 102, it constituted only a border to the inflamed or ulcerated patches of Peyer; in two, 116 and 296, it was arranged in circumscribed patches, and in one, 273, darkened by spots of ecchymosis. In one, 53, of the remaining four cases the mucous membrane of the ileum was softened, in a second, 67, thinned, in a third, 297, pigmented in punctated slate-colored patches, and in the last, 298, of a grayish-slate color from deposits in the villi.

The condition of the mucous membrane of the ileum was not stated in one hundred and seven of the two hundred and thirteen *mixed* febrile cases; it was more or less reddened, congested or inflamed in eighty-two and variously affected by inflammatory action in twenty-four. In some the injection was slight; thus in 204 it gave only a faintly pink tinge to the membrane. In the seven cases, 137, 172, 198, 200, 320, 321 and 329, the congestion was confined to the vicinity of the inflamed and ulcerated patches of Peyer, around each of which it formed an areola; in the last-mentioned case the mucous membrane of the upper part was thinned and its valvulæ almost obliterated. In the nine cases, 140, 208, 217, 221, 302, 341, 344, 359 and 238, the congested or inflamed condition was found only in the lower part of the ileum; in the last-mentioned case the membrane was thinned and softened in the upper part of its track. In the five cases, 190, 209, 312, 331 and 333, the congestion, although affecting also the upper part, was noted as especially intense towards the ileo-cæcal junction. It was disposed in scattered patches or streaks in the twelve cases, 148, 189, 199, 201, 203, 275, 310, 318, 343, 352 and 369, in one of which, 203, an ecchymosed patch was observed, while the congested spots in 369 were thinned and in 318 thinned and softened. Thickening was usually associated with the congestion, but in the four cases already mentioned and in 338 the membrane was thinned. In the remaining forty-seven of the eighty-two cases the congestion was general throughout the ileum. Of the twenty-four cases in which various conditions of the mucous membrane were recorded it was said to have been softened in 194, 212, 213, 216, 239, 284, 323 and 339; thickened in 233 and 345; thinned in 282; thin, pale and easily torn in the lower part in 181, and of a dark-grayish color in 193. It was said to have been ulcerated, apart from the ulcerations of the agminated glands, in 165, and the erosions in 300 appear also to have been in addition to the destruction of the membrane at the site of the ulcerated glands. The ileum is said to have been denuded in its lower part in 219 and 220 and gangrenous in 311. In five cases, 139, 161, 301, 304 and 354, it was healthy in its upper part, while in its lower part the condition of the glands only is stated; but in case 332 it is said that the surrounding villi were not affected. From these last observations it seems probable that in many of the large number of cases in which the condition of the mucous membrane was not recorded the failure to report its appearance arose from the fact that it presented nothing of importance apart from the condition of the glands.

The LARGE INTESTINE.—Of the fifty *typhoid* cases the inflammatory processes affected both the large and small intestine in seventeen, and the small intestine alone, so far as can be learned from the records, in thirty-three, but in two of these, 18 and 41, it is stated that the large intestine was not examined. The large intestine was therefore congested, inflamed or ulcerated in seventeen of forty-eight cases, or in 35.4 per cent. In one of these cases, 27, ulceration of the solitary glands was the only abnormity mentioned; but in six other cases the general appearance of the mucous membrane was recorded in addition to the condition of the crypts, which will be considered here-

In the LARGE INTESTINE distention was observed with much more frequency than in the small intestine. It was present in twenty-two of thirty-nine cases, and in sixteen of the twenty-two it was considerable. Notwithstanding a great distention of the gut its coats were not thinned, but on the contrary rather thickened, a result considered due to the reaction of the membranes on the distending gases. Its mucous membrane was white in thirteen of forty-three cases and yellow-tinged from fæces in two; its color was uniformly red in fifteen cases, in three of which the redness was general and in twelve localized; in four cases there were circumscribed red patches; the membrane was grayish in color in nine cases, all of which were fatal at a late date. The mucous lining was of normal consistence in thirteen of the forty-three cases; softened throughout its whole extent in sixteen; throughout its first or second half in eight; in the cæcum and rectum in one; in the cæcum only in two, and at different points in the extent of the intestine in three cases. Enlargement of the SOLITARY GLANDS, usually not numerous and with no manifest change in the mucous membrane of the locality occupied by them, was found in eight cases: in a ninth case the enlarged glands were numerous, scattered over the whole extent of the canal, ulcerated at their summits and with the submucous and muscular coats near them considerably thickened. Four other cases presented hard patches like those occurring in the small intestine, [illegible] from [illegible] to four lines in diameter, and ulcerated freely in one instance. Ulceration was found in fourteen cases, but they were rarely numerous: they varied from four to thirty lines in length and affected the cæcum alone, or, in conjunction with other parts of the intestine,

after: Thus in 22 it was soft and of a grayish-slate color, in 24 mottled red and slate-colored, in 26 greenish, in 31 dark-colored, in 48 greatly congested and in 50 inflamed. In two cases, 25 and 28, the cæcum was congested; in one, 47, dark slate-colored, and in four, 30, 32, 33 and 49, ulcerated; in the first mentioned of these four there was also an inflamed condition of the rectum, in the second of the colon, while in the third the cæcum had become perforated. Ulceration was also found in 23, in the lower part of the intestine, where it was unconnected with the state of the solitary glands. The mucous membrane of the colon was inflamed and thickened in 29. Lastly, in 21, the colon is said to have contained a considerable quantity of blood.

Of the sixty-three *malarial* cases the large and small intestines were affected in thirty-eight, the large alone in two, and the small alone, so far as is shown by the records, in nineteen. The intestines in the four cases not accounted for in the preceding statement presented no lesion other than pigmentary deposits confined, in case 291, to the agminated and solitary glands of the small intestine, but involving also the walls of the large intestine in cases 90, 289 and 290. The large intestine was thus implicated in forty-three of sixty-three cases, or in 68 per cent. In thirteen of these cases, 71, 73, 78, 81, 88, 252, 257, 261, 263, 362, 363, 365 and 373, the mucous membrane of the large intestine was generally congested or inflamed; in 87 softened; in 90 bluish; in 287 discolored, and in 80 diseased, while in 289 and 290 pigmentation of the solitary glands was the only abnormal appearance recorded. The mucous membrane of the colon was congested or inflamed in ten cases, 91, 251, 254–256, 260, 278, 292, 294 and 387, in the first of which the inflamed membrane was also ecchymosed; it was thickened and softened in 108, slate-colored in 276, and gray with a few red patches in 293. The rectum was affected in four cases: In 72 its lining was softened; in 70 inflamed and softened; in 262 injected and thickened, the colon being similarly affected; and in 274 congested, the large intestine generally being slate-colored. Ulceration was mentioned in seven of the cases: In 386 the lining membrane of the intestine was slate-colored, with patches of congestion, ecchymosis and ulceration; it was inflamed and ulcerated throughout, but particularly in the rectum, in 115; the lower part of the bowel was ulcerated in 84, ulcerated and gangrenous in 76; the colon was ulcerated in 89, slate-colored, injected and ulcerated in 295, and thickened, softened and ulcerated at its commencement and termination in 376.

Of the sixty-one *typho-malarial* cases the large intestine was affected in twenty-nine, the small intestine alone in thirty-one, but in three of these, 52, 64 and 83, the large intestine was not examined. In one case, 69, nothing is said concerning an intestinal lesion. The large intestine was thus involved in twenty-nine of fifty-seven cases, or in 51 per cent. In three of these cases the glands only were mentioned: In 285 as enlarged, in 298 as pigmented and in 85 as ulcerated. The membranous lining of the intestine generally was congested or inflamed in the five cases, 66, 86, 92, 112 and 273; in 296 it was slate-colored and injected in patches; in 297 the dark coloration was confined to the cæcum and in 67 and 68 to the colon. The colon was congested or inflamed in 100, 102, 106 and 116, and strictured in 77. Ulceration was present in twelve cases; generally throughout the intestine in 74, 103 and 266; in the colon in 65, 99, 101, 109, 110, 264 and 265; in the colon and rectum in 75, and in the rectum alone in 98.

Of the two hundred and thirteen *mixed* cases the large intestine was more or less affected in one hundred and six, the small alone, so far as can be learned from the records, in one hundred and one. In six cases, 378, 379, 381–384, the record is silent concerning the condition of the intestinal tract. The large intestine was thus implicated in one hundred and six of two hundred and seven cases, or in 51.2 per cent. of the cases. In fourteen of these cases, 163, 164, 168, 169, 188, 192, 193, 197, 199, 281, 319, 329, 334 and 338, the recorded statements as to the condition of the large intestine refer only to enlargement or ulceration of its glands or pigmentation of its walls. The intestine was more or less congested or inflamed in twenty-one cases, in one of which, 173, the congestion was disposed in patches; in another, 282, it was particularly intense in the cæcum, while in a third, 370, in the lower part of the bowel it resembled ecchymosis. In addition to these twenty-one instances of congestion the lining membrane of the large intestine as a whole was recorded as greenish in 181; thickened and softened in 239; thinned, softened, pigmented and slightly congested in 380; soft and disorganized in 323; ecchymosed in 301; while in 187 its ruga were elevated and its calibre contracted. The colon was constricted in two cases, 160 and 243; in 176 it contained coagulated blood; in 227 and 302 its mucous membrane was thickened and softened; in 162 dotted with minute oval purpuric spots; in twenty-two cases it was congested or inflamed: In ten of these this condition appears to have been general, while in seven, 170, 184, 245, 312, 327, 330 and 333, it was more particularly observed at the commencement; in three, 279, 310 and 337, towards the lower end of the bowel, and in two, 203 and 324, at both of the extremities. Ulceration was present in thirty-seven of the cases. It affected the intestine generally in the thirteen cases, 167, 171, 178, 185, 229, 232, 234, 236, 238, 242, 244, 300 and 351, but in 300 the action was especially manifested in the sigmoid flexure, where perforation had taken place; it affected the cæcum in the eleven cases, 161, 165, 172, 177, 237, 313, 314, 325, 332, 348 and 353; the colon in ten cases, 166, 233, 235, 240, 241, 315, 317, 318, 320 and 360, in one of which, 318, there were purpuric spots; the rectum in one case, 299, but in addition to this the lower end of the bowel was gangrenous in one case, 311, and disorganized in another, 316.

The condition of the SOLITARY GLANDS was observed and stated in thirteen of the fifty *typhoid* cases. They were inflamed in one; ulcerated in six; sloughing in two; in most of the cases they were unusually prominent,

in ten cases. The ulcers were in some cases evidently an affection of the solitary glands, but in others their site was the mucous membrane in the intervals between these crypts. In one of the cases an ulcer near the anus communicated with a small submucous abscess. Excepting the hard plaques the morbid changes in the large intestine were the same in those who died of typhoid as in those who died of other acute affections, and the difference of proportion was considerable only in the instances of meteorism and ulceration of the mucous membrane. Thus, in forty-five cases of typhoid fever the membrane was generally red in three, partially red in ten, grayish in nine, generally softened in sixteen and partially softened in fourteen, while in sixty-nine cases of other acute maladies there was general redness in three, partial redness in twelve, a gray color in seven, general softening in twenty-two and partial softening in twenty-five cases. Meteorism was observed only in three cases and in none of them to the extent found in typhoid fever; while excluding one case of dysentery, in which the colon presented many ulcers, erosion of the membrane was discovered in three cases only, and of them instances of lung inflammation.

and in four this enlargement was the only abnormal condition reported. In some instances it is uncertain from the terms of the record whether the glands of the large intestine were involved in the morbid processes: Thus, in 4, 6, 7, 13, 14 and 17, the changes in the solitary glands were mentioned in connection with those of the patches of Peyer, while nothing was specified with regard to the glands of the cæcum or colon; and in 28 and 31 the solitary glands of the ileum were particularized, while those of the large intestine and even the intestine itself were not mentioned. On the other hand, in the three cases, 23, 24 and 27, the glands of the large intestine were affected as well as those of the ileum, although in one of these, 23, the appearances were not similar, the glands of the latter being prominent only, while those of the former were blackened by pigmentary deposits. Again, in the two cases, 26 and 48, the glands affected were confined to the large intestine. Hence, so far as the indefinite terms of the *post-mortem* records permit of a knowledge of the locality of the altered glands, those of the ileum were affected in eleven cases and those of the large intestine in five.

The condition of the glands was observed in a larger proportion of the *malarial* than of the typhoid cases. Twenty-nine observations were made, in four of which, 257, 260, 261 and 263, the glands of both the large and small intestines were normal. Of the remaining twenty-five the glands were reported congested in one, 258; inflamed in two, 278 and 386; ulcerated in five, 84, 89, 295, 375 and 376; disorganized in three, 70, 73 and 363, and pigmented in nine. In most of these there was coexisting enlargement, but in five cases, 87, 252, 254, 287 and 373, prominence of the glands was the only abnormal condition stated. In some instances the same difficulty is found in determining the site of the affected glands that was experienced in certain of the typhoid cases. They were mentioned in general terms, but in connection with the patches of Peyer in two cases; those of the ileum were reported altered in seven cases, in which more or less uncertainty attaches to the condition of the large intestine; those of both intestines were affected in thirteen, while in three the glands of the large intestine alone are mentioned. Hence, so far as the terms of the record permit of a knowledge of the locality of the glands affected, those of the ileum were implicated in twenty-two cases and those of the large intestine in sixteen. In 290 and 291, of the nine in which the change consisted in the deposit of pigmentary matter in the glands, with or without enlargement, congestion or ulceration, the altered glands were those of the ileum; in 91, 289, 292, 294 and 387 all the solitary glands were thus affected; in one, 362, those of the large intestine were pigmented, while those above the ileo-cæcal valve were simply enlarged, and in 293 the black deposit was reported present in the large intestine only. Usually the glands in the large and the small intestine were similarly affected, 362, already instanced, being exceptional in this regard, and also 84, in which the glands of the large intestine were prominent while those of the small intestine were ulcerated.

Seventeen observations were recorded in the sixty-one *typho-malarial* cases. Of these there was no unhealthy condition in two, 54 and 102; simple enlargement in three, inflammation or ulceration in eight and pigmentation in four. The glands of both the large and small intestines were affected in three cases; of the large intestine alone in three cases; and of the ileum in nine cases, in which more or less uncertainty exists as to the condition of the large intestine. Hence, the crypts of the ileum were altered in twelve cases; of the large intestine in six cases. In but one instance, 116, were the glands of the ileum said to have been pigmented, although in 297 the mucous membrane was slate-colored and in 298 deposits in the villi darkened its color. The solitary glands of the colon were pigmented in five cases,—in 116 and 298, just mentioned, in 67, in which the crypts of the ileum were not mentioned, and in 68 and 296, in which they were inflamed or ulcerated.

The condition of the solitary glands was observed and noted in fifty-one of the two hundred and thirteen *mixed* febrile cases, and in one of these, 329, the crypts were normal throughout the whole of the intestinal canal. The glands were enlarged in eighteen cases, ulcerated in twenty-three and pigmented in nine cases, in some of which enlargement and ulceration were also present. The site of the affected glands is uncertain in some instances and in others definitely stated: In twelve cases the glands were mentioned in connection with the patches of Peyer, whence it may be inferred that those of the small intestine were certainly affected; the ileum appears indicated as the site in eighteen cases, in the majority of which the condition of the glands of the large intestine is more or less uncertain, as in only one, 203, are they stated to have been normal; both the ileum and large intestine were involved in nine cases, while the large intestine alone was mentioned in eleven. Hence it may be said with certainty that the solitary glands of the ileum were implicated in at least thirty-nine cases and those of the large intestine in at least twenty cases. Pigmentation was found in the glands of the ileum in 141 and 302, in which no reference was made to those of the large intestine, and in 200 and 201, in which the glands of the large intestine also contained the deposit; in 203, 320 and 380, in which the crypts of the ileum were enlarged or congested, those of the large intestine were pigmented; the latter glands were pigmented also in 331 and 334, in which those of the ileum were not mentioned.

Perforation of the intestine and peritonitis.—In twelve of the fifty *typhoid* cases, or in 24 per cent., the intestine was perforated by the ulcerative processes, the situation of the perforation being in Peyer's patches in the six cases, 16–20 and 32; in the ileum and probably in the patches in the five cases, 15–46 and 50, and in the cæcum in case 33. Peritoneal inflammation generally followed this accident, but in 32 it is said that there was no evidence of inflammatory action. In 19 and 23 fæces had escaped into the peritoneal cavity. Peritonitis occurred in the absence of perforation in cases 31 and 49, apparently without any other immediate or determining cause than the morbid condition of the glands of the mucous membrane and mesentery. In striking contrast with this record, there was but one case of perforated intestine among the sixty-three *malarial* cases. In this instance, 367, the ileum had given way, while Peyer's patches were reported free from disease. Peritonitis was present in 89, in which the intestines were in a gangrenous condition, and in 249, in which it was apparently due to a rupture of splenic cysts. Perforation occurred in six of the sixty-one *typho-malarial* cases, or in 9.8 per cent.: In 107 the small intestine was recorded as the site, in 82, 83 and 106 the ileum, and in 64 and 103 the ulcerated aggregated glands. Peritonitis occurred without perforation in the five cases, 63, 93, 101, 296 and 298; in 63 it may have been connected with the

degenerated condition of the recti muscles, and in 296 with morbid changes in the spleen. Perforation of the intestine was observed in twenty-four of the two hundred and thirteen *mixed* cases. The accident is stated as having taken place in the intestines in case 244; in the large intestine in 300; in the small intestine in 226; in the ileum in nine cases, 223–225, 245, 309, 346, 347, 360 and 385, and in the patches of Peyer in twelve cases, 152–159, 204, 322, 327 and 328. Case 385 is exceptional as showing a possibility of recovery even after perforation; in it there was neither escape of the intestinal contents nor peritonitis, on account of the occlusion of the aperture by adhesion to the serous covering of the bladder. Peritonitis was reported as having occurred in seven cases in which no mention was made of perforation; in 203 and 337 it was probably tubercular; in 151 connected with the condition of the abdominal recti muscles; and in the others, 150, 311, 353 and 361, with the state of the interior tunics of the intestinal canal.

PIGMENTARY DEPOSITS in the intestine are mentioned in only two of the fifty *typhoid* cases; in 23 near the pylorus and in the solitary glands of the large intestine, and in 26 in which the ulcerated glands near the ileo-cæcal valve were of a dark-blue color. The colon, however, was slate-colored, greenish or dark-colored in cases 22, 24, 26, 31 and 47. Pigmentation was found in twenty of the sixty-three *malarial* cases, or in 31.7 per cent. of the cases: The patches of Peyer were dotted with dark-colored spots presenting what has been called the shaven-beard appearance in the six cases, 87–90, 115 and 288, as also in the eight cases, 91 and 289–295, in which the solitary glands are mentioned as involved in the pigmentation; the ileum and mesenteric glands were blackened in 258, although the patches of Peyer were healthy; in 287 the patches were prominent and speckled with blood and the mucous membrane of the colon discolored; the interior of the colon was slate-colored in 274 and 386, and its solitary crypts blackened in 362 and 387. The intestines were blackened by deposited pigment in ten of the sixty-one *typho-malarial* cases, or in 16.4 per cent.: Peyer's patches were affected in 54, 86 and 96, and the solitary glands also in 116 and 296; the ileum and colon in 297 and 298; the colon alone in 265, and its solitary glands in 67 and 68. Peyer's patches presented dark-colored ulcerations or deposits in the four cases 148, 149, 181 and 368 of the *mixed* series. The colon or its glands are alone mentioned as pigmented in the twelve cases, 168, 169, 174, 198, 202, 203, 302, 310, 320, 329, 334 and 380, while Peyer's patches were also affected according to the records of 200, 201, 331 and 338, and the ileum according to that of 199. The solitary glands of the small intestine were pigmented in 141 and 165, and the ileum was of a blue-slate color in 333, which also presented dark-blue spots in the bladder near the orifices of the ureters. The intestines were of a dark-gray color in 193. These twenty-five instances of deposited pigment form 11 per cent. of the total of two hundred and thirteen mixed febrile cases. But there should be mentioned in this connection the ecchymoses or purpuric spots in the large intestine in cases 162, 183, 189, 301, 318 and 370.

The condition of the MESENTERIC GLANDS is mentioned in but fourteen cases of the *typhoid* series, in all of which there was notable enlargement. In the *malarial* series the glands are mentioned fourteen times; in twelve cases they were enlarged and more or less altered in color, while in the two others, 274 and 374, they are said to have been healthy although Peyer's patches were much affected; in 70 the enlargement was so great and general that the mesentery had the appearance of being one continuous gland. In the *typho-malarial* series their condition is recorded seventeen times; enlarged and more or less deeply colored or affected with yellow softening in sixteen cases, and ulcerated in one case, 93. In the *mixed* series they were inflamed, enlarged and softened in all of forty-five cases except two, 307, which contained chalky concretions, and 331, normal notwithstanding the affection of the agminated glands.

The appearance of the SPLEEN is stated in thirty of the fifty *typhoid* cases, in only two of which was it normal. The alteration consisted of enlargement and softening, sometimes to pulpiness, frequently associated with a darkened color. In case 37 the spleen was three times its usual size; in 9 it weighed forty-one ounces; in one case only, 42, one of sequent consumption, was it small and hard. Its condition was reported in fifty-two of the *malarial* cases. It was normal in eighteen and small in six cases, 90, 91, 252, 259, 276 and 291; it weighed only three ounces and a quarter in one of these, and was tough and of a dark color in most of them. In the other instances it was enlarged, congested, soft, flabby or friable; in 70 it was three times its usual size; in 87 it was similarly enlarged and

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The LYMPHATIC GLANDS.—All of the *mesenteric* glands corresponding to altered plaques suffered a modification of size, color or consistence. They were enlarged and rose-colored, subsequently becoming softened, of a darker red and developing yellowish points or purulent foci in their tissues; and even the glands corresponding to apparently healthy patches in ten of the forty-six cases were found to be enlarged and reddened. The *mesocolic* glands were marked by inflammatory changes in fourteen of nineteen cases in which they were examined, and although these changes were associated with redness, softening or ulceration of the membrane in most cases, in others the membrane was healthy; nevertheless, these glands in no case contained purulent deposits. Enlargement and reddening of the glands of the *stomach* corresponded in three cases with inflammatory conditions of the mucous lining of that viscus, but in a fourth case, in which the glands were affected, the lining was healthy, and in a fifth case this want of correspondence was reversed. LOUIS considered that this latter condition was of frequent occurrence, although not recorded by him. He argued that while the stomach was very frequently altered, he could scarcely in his *post-mortem* work have failed to notice corresponding enlargement of the glands had such a change been present. The *lumbar* glands were large and firm in two cases, in one of which the patient succumbed to a sequent erysipelas of the lower extremities. In a similar case the *inguinal* glands were large, red and contained white pus; in three others, in which the legs had been blistered, these glands were inflamed but had not suppurated. The *cervical* glands were enlarged and reddened in nine of twelve cases in which they were examined. Six of the nine had concurrent ulceration of the pharynx, but in the three others there was no marked lesion of the organ corresponding to the glands. In patients who died of other acute maladies the mesenteric glands were large and red in six cases of small-pox, scarlet fever, pneumonia and erysipelas, and somewhat softened in one case of small-pox, but in none of these was the change comparable with that suffered by the glands of the lower part of the mesentery in typhoid fever. The cervical glands were affected in four cases, three of which were eruptive fevers, and in only two of these was there a manifest alteration of the air-passages. It is inferred from these facts that while the condition of the glands does not in all instances depend on that of the organs with which they are connected, the typhoid affection establishes a marked predisposition to inflammatory changes in the mesenteric and cervical glands.

The SPLEEN was unaltered in four only of the forty-six cases. It was more than three times its usual size in seventeen cases; more than double its usual size in nineteen, but slightly enlarged in nine and apparently small in one case. It was softened in thirty-four, and in seven of these, in which the softening was extreme, the organ was largely increased in volume; but in no instance was pus found in its tissues. It was observed that the tumefaction and softening specially characterized those cases that were speedily fatal, while the organ was more frequently normal or but

contained abscesses: in 277 its surface was mottled with spots surrounded by reddish areolæ and its section exuded a sero-purulent liquid: in 258 it contained tubercular masses and in 249 cysts, the cheesy contents of which had in part escaped into the peritoneal cavity. Its condition was not stated or not observed in nineteen, normal in eight and altered in thirty-four of the sixty-one *typho-malarial* cases. In case 266 it weighed three ounces and a half and was firm: in 67 it was small but extremely soft. With these exceptions it was enlarged, congested, softened and often discolored in color. In case 69 it is said to have been rotten: in 296 it had an inflamed condensation of its tissue about the size of a turkey's egg at its upper end and the contiguous omentum was also inflamed. In the *mixed* series the spleen was normal in thirty-six and variously changed in one hundred and seven cases. It was small in seven of these, 201, 213, 228, 281, 306, 329 and 331, varying in weight from one ounce and a half in 213 to four ounces and three-quarters in 281. It was discolored but not enlarged in a few instances. Generally the organ was large, congested, dark-colored and more or less softened; in 132 it weighed forty-one ounces, in 349 thirty-six ounces and in 129 thirty-four ounces; in 137 and 221 the alteration of the tissue approached decomposition, and in 137 it was pultaceous; in 369 it was light-colored and hardened in portions of its substance, but softened and suppurating near the hilus; in 264, underlying old pleuro-pneumonic adhesion, was a cavity containing an ounce of viscid green liquid: 148 and 214 also contained cysts: in 204 the superficial layer of the splenic parenchyma was colored slate-blue by molecular deposits.

The appearance of the LIVER was recorded in twenty-nine of the fifty *typhoid* cases: It was normal in eleven, leaving only eighteen in which the attention was called to diseased conditions. The liver was large in four of these, soft in one, large and fatty in one, large and pale in two, large, pale and soft in two, large and fatty in one, pale and fatty in one, large and congested in one, congested in four and mottled in one. In the sixty-three *malarial* cases the condition of the liver was recorded fifty-three times; in twenty-one it was normal and in thirty-two altered. Enlargement is mentioned in most of the cases: but there was generally more than this, for enlargement alone is mentioned in but one of them. The organ was soft, flabby or friable in five cases; pale in four, in one only of which it was firm: fatty in four; waxy in one; congested in five; dark-colored or bronzed in seven; in 249 it was covered with cancroid lumps: in 80 it adhered to the diaphragm and in 367 to the intestines also: in 87 it contained minute abscesses and in 256 a single abscess of large size. In the sixty-one *typho-malarial* cases the liver was reported normal in nineteen and variously changed in appearance in twenty-six cases; in sixteen its condition was not examined or not stated. Enlargement was generally observed, and in four cases this was the only change mentioned. The organ was pale in four cases: soft in four, in which this condition is stated alone or with enlargement: fatty in four and of the nutmeg appearance in one: dark or bronzed in three; congested in five and emphysematous in one. In the *mixed* series of febrile cases the condition of the liver was not stated in seventy-one, normal in fifty-five and altered in eighty-seven. Enlargement alone is mentioned in eighteen and in conjunction with various changes in many of the others. The organ was pale in twelve, in two of which it was reported flabby and in one firm. It was anæmic in one case, 337: jaundiced in 144: fatty in nine: of the nutmeg appearance in two, 306 and 315: soft, flabby or friable in eleven, in one of which, 199, its substance was emphysematous, of the color of sanious pus and possessed of a disagreeable odor, while in another, 167, in which the parenchyma was of a greenish color, a chicken-coop odor was observed. It was soft also in two of seven cases which were reported congested, and in two, 125 and 320, in which there were adhesions: in three others, 328, 337 and 347, the serous coat adhered to contiguous organs. It was brown or dark-colored in eight, mottled in 181 and 198, of a blue-slate color in 154, ecchymosed on its surface and slate-colored on section in 380, and small, weighing only twenty-eight ounces and a half, in 281.

The GALL-BLADDER OR ITS CONTENTS were observed in seven of the *typhoid* cases: The viscus was small in 29 and large in 31,—in the former it was half filled with bile: it was completely filled with viscid bile in 48; contained five drachms of yellow bile in 24; eleven drachms of dark-green bile in 47; twenty-six drachms in 23 and ten ounces of brown bile in 26. Observations were made in sixteen of the *malarial* cases: The viscus was distended with dark-green or yellow-colored bile in the six cases, 70, 80, 104, 248, 365 and 376; one ounce was said to have been present in 90 and 277, and about two ounces in 263, 276 and 373, the bile in the last-mentioned case having been watery: the gall-bladder in 274 and 289 was empty, and in 287, 288 and 362 the quantity of its thick or pitchy contents was small. Among the *typho-malarial* cases fourteen observations were made: The gall-bladder was distended with bile in all in 112, empty or nearly so in 61 and 296; it contained six drachms of bile in 62, three ounces in 100, and was distended in the seven cases, 67, 69, 75, 86, 92, 94 and 96; generally the bile was of a dark or black color and of viscid viscidity, but in the last-mentioned case it was described as watery. In 95 the walls of the gall-

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...in volume or diminished in consistence in those that died at an advanced period; whence it was concluded that these morbid changes ...fested and tended to subside as the duration of the attack was lengthened. The spleen was darker than usual in one-half of the cases and ...in nine cases: but no constant relation existed between its color and its volume or consistence. Nor was any relationship detected ...and that of the mucous membrane of the stomach or intestine. In diseases other than typhoid this organ was enlarged in eleven ...of eighty-three cases: but the softening was more frequently connected with a diminished than an increased volume. From ...that enlargement and softening of the spleen are peculiar to and characteristic of the typhoid affection.

...seldom altered in size; it was larger than usual in five cases and smaller in two cases. It was not firmer than the normal in a ...softened in twenty-two, in four of which the fingers penetrated its substance without resistance, and this softness was generally ...with a passive rather than with a congested state. The liver was of its natural color in twelve of the forty-six cases; it was pale in ...of which there was a coexisting softness; in eight it was redder than usual; in one it was yellowish with purplish star-...: in one the organ contained suppurating tumors, and in three its bloodvessels were permeated by a greater or less ...any emphysema of its substance.

...ly inflamed in three cases in which its contents were purulent and its lining membrane reddened; in a fourth case ...ixed with gray and the contents a turbid grayish liquid. The bile was reddish-yellow, sometimes with a greenish ...more copious than usual in ten of the twenty-five; in others it was thick, viscid and blackish; in two, ...the bile was replaced by a transparent aqueous liquid of the color of urine. But similar conditions ...diseases, although not perhaps with as much frequency as in typhoid.

bladder were disorganized and perforated, the bile in this instance having been of a light-green color. Thirty observations were made in the *mixed* series: The bladder was healthy in one case, 328, large in one, 225, small and collapsed in one, 204, and empty or nearly so in 191, 282, 311, 380 and 381. It contained one fluid ounce or less of bile in the four cases, 137, 154, 182 and 304, dark-brown in the second instance, and gamboge-colored in the third. In 155 it contained twelve drachms of dark bile, and in 185, 139, 187 and 166, respectively, two and a half, three, three and three-quarters and five ounces of liquid. It was distended also in the twelve cases, 125, 132, 151, 171, 189, 192, 198, 245, 302, 317, 338 and 383. In 327 the walls of the gall-bladder were disorganized by their participation in a general peritonitis.

Only two observations on the PANCREAS were recorded in the *typhoid* series: In case 29 the gland was said to have been enlarged and somewhat hard; in 24 it was normal. Of thirteen observations in the *malarial* cases the pancreas was normal in eight, 84, 115, 263, 277, 289, 292, 295 and 366; it was soft in one case, 67, in which it was of a reddish color, and firm in three, 90, 274 and 278, in the first of which its color was white and in the others somewhat reddened; in 288 it was of a purple-flesh color, and in 373 dark-colored and slightly congested; its weight varied from two and a half to four and a quarter ounces. Nine observations were recorded in the *typho-malarial* cases: In 62, 68, 93, 110 and 265 it was normal; in 111 large; in 112 of a grayish color; in 67 soft and of a dull-red color, and in 86 reddened and increased in weight to seven ounces. Of seventeen observations in the *mixed* series the organ was normal, so far as can be learned from the records, in thirteen cases, its weight ranging from two and a half to four ounces; it was recorded as white in color in 154, 155, 181 and 380, not very firm in the first-mentioned case, hard or firm in the three others.

The KIDNEYS in thirteen of twenty-seven cases of *typhoid* were normal. In five of the remaining fourteen they were congested, with concomitant enlargement in two instances; in three others they were enlarged and in one of these granular; in five they were pale or fatty, and in one, 26, the right kidney was pigmented on its surface and contained an abscess with ecchymosed walls, while the left was merely congested. In sixteen of thirty-seven *malarial* cases the kidneys were normal; in thirteen they were congested, with softening superadded in one instance; enlargement was noted in three, in one of which the organs were soft and in another fatty; they were pale in one, flabby in one, fatty in one; in 278 the right kidney contained a small abscess, and in 374 the left was represented by a closed cyst in which no glandular tissue could be detected. Of twenty-eight *typho-malarial* cases they were normal in eighteen; congested in four, in one of which they were said to have been fatty; large in two; small in one; small and pale in one; in one case, 110, the right kidney was small and transformed into a thin-walled cyst, while the left contained large abscesses, and in 93 both were inflamed to suppuration. In sixty-two of one hundred and eight cases of the *mixed* series in which the kidneys were examined they were pronounced normal. Of the remaining forty-six cases they were congested in twenty-two, in one of which, 187, there were ecchymosed spots; large in four, 227, 275, 369 and 370; pale in two, 217 and 302; fatty in five, 178, 244, 307, 317 and 345; soft or flabby in six, 199, 181, 148, 182, 304 and 309, and in the first-mentioned of these they were tumid and emphysematous, like the liver in the same case, while in the second the left kidney was ecchymosed; in 243 traces of inflammation were said to have been present in the right kidney, and in 219 and 220 suppuration had taken place; in 228, 222, 318 and 334 there were cysts which, in the first-mentioned case, contained purulent matter.

The SUPRARENAL CAPSULES were mottled in case 23 of the *typhoid* series. They were reported healthy in three *malarial* cases, 115, 274 and 292; soft and fatty in 373. Their condition was reported in five cases of the *mixed* series: Yellow in 183, soft in 245, small, dark and tough in 281, firm, large and of a reddish-ash color in 380, and showing traces of inflammation in 243.

URINARY BLADDER.—The only observations of interest respecting the condition of this viscus occur in the *mixed* cases: Its mucous membrane presented bluish spots in case 333 and was ecchymosed in 342; the prostate in 239 was enlarged and contained pus.

The PERICARDIUM was seldom altered. It contained an unusual quantity of effused liquid in case 36 of the *typhoid* series, a small quantity of bloody liquid in 26, and in 42 the sac was tuberculous. A manifest excess of liquid was found in three of the *malarial* cases, coinciding with effusion into the pleura in 258, with bronchial inflammation on the left side in 249 and with a healthy condition of the lungs and pleuræ in 262. No indication of inflammatory action was recorded in these cases of effusion; but in 90, in which only six drachms had exuded, the contained flocculi and the fibrinous coating over the serous surfaces testified to an intercurrent pericarditis; in 276 there were adhesions and the surface of the heart was covered with dark spots and exuded lymph. In the *typho-malarial* series three cases, 52, 61 and 75, presented an excess of serum, with some injection of the sac in the first-mentioned instance; in 280 there were signs of recent pericarditis, and in 296 the serous surface was roughened by exudation unconnected with the fatal illness. In the *mixed* series five cases presented evidence of a pericarditis which antedated the typhoid attack: In 324 the opposing pericardial surfaces showed some small roughened patches; in 356 they were united by a fibrinous band; in 368 the adhesion was more intimate, leaving only a small sac at the apex in which was an ounce of serum, while in 137 and 139 the sac was wholly obliterated. Moreover, in 320 the pericardium was firmly united to the costal cartilages and sternum. On the other hand, in 182 and 183 the effused liquid, although not large in quantity, was of a red color, and in 309 the sac is said to have been filled with

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The KIDNEYS were seldom and slightly affected. They were somewhat enlarged in three cases and of diminished consistence in six of thirty-six cases. Their color was darker than usual in seventeen of forty-two cases, and this coloration was more frequent in those who died early. The mucous membrane of the pelves was thickened and injected in one case, and in a second, presenting similar injection, it was bathed in pus.

The lining of the BLADDER was injected in six cases, somewhat softened in two, and in one slightly ulcerated near the urethral entrance.

The PERICARDIUM was seldom altered; in seven cases it contained a little serous liquid, which, in one instance, was sanguinolent. None of the cases presented the slightest trace of recent inflammation, in this differing from cases of other acute maladies and especially from cases of pneumonia.

purulent matter. Excess of liquid, from three to six or eight ounces, was found in ten cases, 106, 170, 173, 206, 302, 307, 327, 328, 329 and 388, in two of which, 206 and 307, the pericardium is said to have been thickened, and in two others, 173 and 327, somewhat injected; the lungs were more or less engorged in four of these cases; in three the pleural cavities contained effusion, while in three, 170, 206 and 328, there was no concurrent inflammation of the lungs or pleura.

The condition of the HEART is recorded in seventeen of the fifty typhoid cases, in thirteen of which it was normal; in one, 48, pale; in one, 11, soft and flabby; in one, 42, tuberculous on its surface, and in one, 45, having its right cavities dilated. In addition to these observations the contents of the heart were noted in five instances in which no intimation is given of any abnormity of texture. In the *malarial* series the heart was mentioned as normal in twenty-six cases, and in ten others in which reference was made to its covering or contents no alteration of texture was indicated. In twelve cases there were morbid changes: In 252 and 291 the heart was small; in 78 and 377 it presented thickened valves and hypertrophied walls, and in 261 an opaque-white membranous spot on the surface of the right ventricle: it was pale in 262; flabby in 278; pale and flabby in 370; fatty in 251; slightly softened and ecchymosed in 386, and in 90 and 276 there were evidences of pericardial inflammation. In the typho-malarial series it was recorded as normal in twenty cases, and in eleven others in which its covering or contents were mentioned its condition does not seem to have called for remark. Its texture or appearance was altered in nine cases: It was large and hypertrophied in 53 and 96; pale in 112; soft in 67; flabby in 57, 59 and 267; pale and flabby, in 247, and flaccid in 75. The heart is said to have been normal in seventy-one of the mixed cases, and in thirty-three, in which its coverings or contents were mentioned, the condition of its tissue does not appear to have been materially altered. Morbid changes were noted in thirty-six instances: In 317 the heart was reported atrophied: in 340 displaced: in 206 enlarged: its ventricles dilated in 169, 186 and 190, and its mitral valve thickened in 60: in the remaining twenty-four cases the organ had lost its normal color and tonicity: In 193 it was softened; in 242 and 243 thinned and softened, the right ventricle in the latter case being said to have been as thin as glove-leather; in 133, 219 and 333 pale: in 191 pale and soft, this case presenting a small perforation near the apex: and flabby in seventeen, in ten of which, 137, 148, 154, 176, 182, 184, 203, 212, 214 and 230, no other qualification was stated; but in four, 150, 227, 311 and 324, the organ was also said to have been pale; in one, 345, small; in one, 347, anæmic, and in one, 355, soft. In addition to these, antecedent inflammation is indicated by the appearance of the pericardial lining and contents in certain of the cases mentioned in the last paragraph.

The CONTENTS OF THE HEART were stated in only seven of the *typhoid* cases, and in one of these, 48, there was no clot. Both sides of the heart in five cases contained clots, which were fibrinous in 8 and 20, mixed in 24, mixed in 32, fibrinous in the right and mixed in the left cavities in 26. In case 61 clots were found only in the right side, but the contents of the left cavities were not recorded. Of the sixty-three *malarial* cases the cardiac contents were specified in eighteen: In one of these, 277, there were no clots. Fibrinous deposits were observed in thirteen, in two of which, 71 and 293, the side of the heart was not particularized: in four, 258, 274, 292 and 370, they were present in both sides: in seven, 115, 237, 259, 261, 274, 288 and 377, in the right side only, one of these, 274, containing a mixed clot in the left side, and another, 261, a venous or black clot. In 287 there were mixed clots in the right and fluid blood in the left cavities: in 84 and 96 the right side contained black clots, the left in the former presenting a narrow clot of unstated color and in the latter a mixed coagulum: In 291 the right ventricle contained fluid blood, the left being empty but for a small fibrinous clot attached to the chordæ tendineæ. The contents of the chambers of the heart were recorded in sixteen of the *typho-malarial* cases: Fibrinous coagula were reported in ten—in the right side only in six, in one of which, 266, there were venous clots in the left cavities, in the four others the fibrin was deposited in both sides. Clots of unspecified color were noted as present in the heart in 68, 89 and 164, —small and imperfectly formed, in a black and diffluent blood, in the two cases last mentioned. Clots were also found in the right side in 106 and in both sides in 62, but in neither is the character of the coagulum stated: in 6 the right chambers contained fluid blood while the left were empty. The cardiac contents are stated in forty-three of the *mixed* series, in four of which, 137, 165, 194 and 329, there were no clots. In three other clots of an unspecified character, in one mixed clots, in one black clots and in one uncoagulated blood were reported as having been observed in the heart, but the containing cavity is not stated; in three cases unspecified clots were found in the right side and in three in both sides; in one instance mixed clots were found in both sides. Fibrinous coagula were noted in the right side in twenty-seven instances, in twelve of which the contents of the left side were not recorded, but in nine cases similar coagula were found in this side—in one an unspecified clot, in one a mixed coagulum, in two venous clots and in two no coagulum of any kind. The right chambers contained fluid blood in 120 and a mixed clot in 221 and 305, the left chambers of the latter instance being filled with dark clots. The right cavities contained fibrinous coagula in four cases, 159, 169, 139 and 201, associated with similar clots in the opposite side of the heart in the second case mentioned, with a fibrinous deposit in the third, while in the first and last the contents of the left side were not recorded. In 172 and 203 the heart presented a fibrinous clot in the left ventricle only.

LARYNX and TRACHEA.—These parts appear to have met with as little attention at the hands of our medical officers as the contiguous section of the digestive system. Morbid appearances were noted in only six of the typhoid

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The HEART was normal in size, consistence and color in twenty-three of the forty-six cases. Its tissue was softer than natural in seventeen cases, in some it is marked a degree that the organ was [illegible] In [illegible] cases [illegible] softening. These changes were usually most [illegible] the left [illegible] and [illegible] prominent in patients who died at an early period of the attack. Similar changes were found, but with less frequency, in cases of other acute diseases. In the typhoid affection, when the heart was but little softened its cavities, especially those of the right side, contained fibrinous clots; whereas when the softening was greater the fibrinous clots were black, and when the highest degree of flaccidity was present the cavities contained only a few drops of blood mixed with a glairy serum. While these facts seem to indicate a connection between the state of the blood and that of the heart it does not appear to have been necessary cause, as in certain cases of pneumonia, in which the heart was very evidently softened, it contained fibrinous clots in its right cavities.

cases: In 12 the epiglottis was swollen; in 30 ulcerated and œdematous, the vocal chords being similarly affected; in 1 the lining of the larynx was thickened by an exudation in the submucous cellular tissue; in 8, 23 and 32 the mucous membrane of the trachea was congested. In the *malarial* series the mucous lining of the trachea was pale in 84; inflamed, congested or purplish in 90, 115, 259, 277 and 288; the larynx was covered with false membrane in 374; the epiglottis ulcerated, the lining membrane of the larynx and trachea thickened and the vocal chords nearly destroyed in 248. In the *typho-malarial* series only four observations were recorded: In 68 ecchymosed spots were found on the posterior surface of the trachea, and in 101 its mucous membrane was inflamed and ulcerated; in 54 the laryngeal membrane was congested and ulcerated and a small abscess was observed between the cricoid cartilage and the pharynx, and in 67 the epiglottis and chords were œdematous and an abscess was connected with the right arytenoid cartilage. Seventeen observations were made in the *mixed* series: The trachea was congested in 181, 240, 307 and 333, and in 182 the larynx also was involved. The lining membrane of the trachea was soft and dark-colored in 301; of a purple color in 155, 183, 187, 199 and 304, and to this, in 156, some spots of whitish exudation were added. In 329 the mucous membrane, which was thick, soft and discolored, presented a slight exudation on the vocal chords and the laryngeal surface of the epiglottis; while in 122 and 308 the larynx was lined with false membrane. In 185 there was an ulceration below the vocal chords on one side and another in the thyroidean angle. Lastly, in 339 the trachea was inflamed, the larynx ulcerated and the glottis occluded by œdema.

The THYROID BODY was mentioned in but two of the cases, both belonging to the *mixed* series: In 204 it was enlarged on one side, and in 193 the left lobe contained a calcareous mass as large as a walnut and a small cyst filled with dark-brown liquid.

The condition of the BRONCHIAL TUBES was seldom reported. They were inflamed in a few cases, as 29, 32, 38 and 47 of the *typhoid* series; 115, 249, 258, 274, 283 and 362 of the *malarial;* 55, 62 and 102 of the *typho-malarial*, and 124, 148, 169, 185, 191, 193, 239, 245 and 380 of the *mixed* series. In 281 and 331 the smaller tubes were plugged with fibrinous exudation, and in 362 they were so thickened and indurated as to appear on section like small prominences.

The LUNGS were pronounced normal in only five of thirty-four *typhoid* cases in which their condition was stated. They were engorged or congested in fourteen cases; œdematous in one, 3; more or less hepatized or solidified in twelve, 5, 6, 7, 9, 23, 24, 29, 32, 38, 41, 43 and 45; splenified in one, 8, and in one, 42, tubercular. Generally the engorgement and hepatization were in the lower and posterior parts, but sometimes the whole of a lung is said, as in 38, to have been affected. Generally, also, both lungs participated in the pneumonitic processes, but in some, as in 6, one lung only was involved. The third stage of inflammation was reached in case 5. In 29 and 32, hepatization was localized in nodular masses from the size of a chestnut to that of a hen's egg: splenization in 8 was also lobular. It is probable that the term engorgement, congestion or hepatization was used in some instances to indicate that condition of the lung-tissue recognized by LOUIS as splenization, for in case 25 the solidification is evidently distinguished from that caused by inflammatory processes. The lungs were altered in thirty-two of fifty-eight observations in the *malarial* series, normal in twenty-three, and unrecorded in three in which pleuritic adhesions are mentioned. They were engorged, splenified or hepatized in thirty cases, two of which, 258 and 288, were marked by subpleural ecchymoses, three, 252, 276 and 289, contained abscesses, and four, 105, 274, 278 and 377, tubercle; in 113 the lungs were emphysematous, and in 87 the left lung was compressed by a purulent collection in the pleural sac. In the *typho-malarial* series the lungs in nineteen of fifty-one cases were normal and in thirty-two altered. Of the latter they were tubercular in one, emphysematous in a second, œdematous in a third and congested, splenified or hepatized in twenty-nine, in one of which, 65, there was a large abscess in the middle lobe of the right lung. They were normal in forty-seven of one hundred and sixty-three cases of the *mixed* series; congested, splenified, hepatized or infiltrated in one hundred and four, in three of which purulent collections had formed, multiple and small in 138, single in 315 and 383 and of large size in the last-mentioned case; emphysematous in four, tubercular in seven and in one, 340, compressed by a large quantity of bloody liquid in the left pleural sac.

The PLEURÆ.—Adhesions in three of the *typhoid* series, 9, 37 and 45, probably antedated the typhoid attack; but in 5 and 32 they were certainly associated with the fatal sickness. The pleural cavity in 12, 23, 32, 36 and 42 contained serous effusion which was connected in all except, perhaps, 23, with other and distinctly marked signs of

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The EPIGLOTTIS was covered with false membrane in two cases in which the pharynx was similarly affected; in one there was a red spot on its inferior aspect and in seven it was more or less ulcerated, the pharynx participating in the ulceration in three of the cases. From the rarity of ulceration of the epiglottis in other acute diseases LOUIS regarded this lesion like the similar affection of the pharynx and œsophagus as of a character peculiar to typhoid fever.

The GLOTTIS was œdematous in two cases, but this condition was found to be equally common in pneumonia.

The MUCOUS MEMBRANE OF THE LARYNX was blackish and softened in one case, covered with false membrane in three and slightly ulcerated in one.

The LINING OF THE TRACHEA was seldom altered in color and in no case ulcerated.

The BRONCHIAL MUCOUS MEMBRANE was often of a red color; but it was thickened in only one case. Generally the tubes contained a thin bright-red mucus; in three cases they were enlarged.

The LUNGS in fifteen cases were healthy or only a little darker in color posteriorly, with or without some rounded spots a few lines in diameter and depth. In two cases they were somewhat emphysematous. There was splenization in nineteen cases, generally in one or both of the lower lobes, the splenified part being heavier than water, firm, of a dark bluish-red color, giving issue on section to a thick dark-red liquid and destitute of the granular aspect of hepatized lung. Congestion or hepatization was present in seventeen cases, some of which had the lower lobes splenified; the congestion was sometimes lobular, more frequently so than the hepatization, but generally both were continuous, although not occupying in any case a large portion of the organ. Abscesses were found in one of the hepatized lungs. In one case the lung contained a filamentous tumor one inch in diameter; in four cases some semitransparent granulations, and in one case crude tubercle.

The PLEURÆ.—Although adhesions were present in nineteen of the forty-six cases, there were signs of recent inflammation in two only, in one a soft false membrane and in the other a flocculent effusion; the pleural sacs, however, in nineteen cases contained a reddish serosity varying in quantity in individual cases from three to thirty ounces. But similar conditions of the bronchial tubes, pulmonary tissue and pleural membranes were [illegible] in thirty-five cases of other acute maladies exclusive of pneumonia and pleurisy.

inflammation of the membrane, and in 42 with tubercular disease of the lungs; blood was effused into the pleural cavity in 31. In the *malarial* series adhesions were found in the five cases, 251, 362, 364, 374 and 377, but their recent character is not indicated; on the other hand, in 71, 73, 87, 249, 258, 288, 289 and 387 there is evidence of pleuritic complication. The adhesions in 57, 59, 66 and 266 of the *typho-malarial* series are also of old or uncertain date; but in 85 the clinical history shows their recent formation, and in 62 the lymph on the base of the lung connects the small quantity of bloody liquid in the pleura with inflammatory action, although it is not certain that the larger quantity of serum in 69 was the result of other than passive processes; in 65 the right pleura was inflamed, and in 100 the right sac contained four ounces of sanguinolent serum. Pleuritic adhesions, without other indications of pleural inflammation, are mentioned in twenty-three of the *mixed* series; in about half of this number they certainly antedated the fatal attack and probably also in others. In four cases, 128, 238, 329 and 368, effused liquid was found in the pleural cavities, but whether as the result of active or passive processes is uncertain. In three cases, 118, 219 and 283, which presented both adhesion and effusion, the date of neither is defined. Thirteen cases showed decided indications of recent inflammation of the serous membrane—173, 185, 195, 309, 314, 315, 318, 331, 355, 357, 360 and 380. In addition to these 168 and 333 had in each pleural sac a small quantity of dark sanguineous serum, apparently connected with pulmonary engorgement and hepatization, while 340 presented on one side a large effusion of a similar character, which compressed and consolidated the corresponding lung. Pleuritic adhesions in 203 and effusion in 311 were of tubercular origin. The presence of purulent matter in the pleural sacs of 383 was due to the rupture of pulmonary and intermuscular abscesses into them.

The BRAIN AND ITS MEMBRANES were normal in five of eleven *typhoid* cases in which their condition was stated: The membranes were congested in two cases, 8 and 26; in the former the cerebral substance was soft and there was a small quantity of liquid in the ventricles; in the latter the brain was apparently normal. In neither of these is mention made of effusion in connection with the meningeal congestion; but in three others there was a quantity of serum in the subarachnoidal spaces, especially at the vertex, and this was associated in 45 with a normal brain-substance, in 42 with softening of the brain and serum in its cavities, and in 9 with congestion of the cortical substance, marked vascular puncta in the medullary tissue and effused liquid in the ventricles; in 47 there was much serum in the ventricles. The condition of the brain or its membranes was mentioned in seventeen of the *malarial* cases, and in six of these both were normal. Of the eleven in which attention was directed to abnormal appearances the brain alone was mentioned in three—in 276 as anæmic, in 84 as softened, and in 259 as softened and with the ventricles distended with effused serum; in two others the membranes alone were mentioned, the meningeal vessels being injected in 104 and the pia mater anæmic, opaque and wrinkled in 291; in one case, 288, the pia mater was congested in its posterior part while the brain was firm. Of the five cases remaining the subarachnoid spaces and ventricles contained effused liquid in 278; the pia mater and posterior part of the brain were congested in 247; the membranes congested, the subarachnoid spaces distended with liquid and the surface of the cerebrum and the floor of the fourth ventricle ecchymosed in 287; while two cases only, 80 and 257, presented definite evidence of recent inflammation—in the former lymph on the surface of the hemispheres, in the latter on the base of the brain and in both in the ventricles. The brain or its membranes were affected in seven of thirteen *typho-malarial* cases in which they were examined: In 268 attention was directed to the brain only as containing a tumor; in 264 and 297 the condition of the brain was not stated, probably because in neither did it present any abnormity—in both the meningeal vessels were engorged; in 99 and 109 the membranes were anæmic, in the latter the cerebral matter was also anæmic, in the former white and soft; in 86 there was general congestion with effusion into the subarachnoid spaces and ventricles, while in 111 effusion into the ventricles was associated with thickening and opacity of the arachnoid over the interpeduncular space. The brain or its membranes were normal or healthy in twenty-eight of the *mixed* cases, and in two others, 140 and 148, the firmness of the cerebral substance may not be regarded as morbid. Changes from the normal were reported in twenty-one instances: In 202 the cerebral vessels were engorged; in four the condition of the brain alone was stated—as firm and congested in its posterior parts in 304, congested and with a small quantity of bloody liquid in the ventricles in 301, congested and softened in 281, and congested to a crimson color in its upper and anterior portions in 194; in 156 there was some roughness of the ventricular lining but no meningitis. In eight cases the condition of the membranes alone is stated, the brain substance inferentially being normal; in four of these, 168, 208, 343 and 349, there was a slight subarachnoidal effusion; in 344 the meningeal vessels were anæmic and seemed to contain air-bubbles; in 160 and 180 these vessels were congested, and in 117 there was a slight degree of arachnitis, but the facts on which this conclusion was based were

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The CEREBRAL MEMBRANES.—Four cases had two or three small spoonfuls of clear serum in the upper part of the arachnoid; and in one of these some albuminous particles adhered to the visceral layer, while in a fifth case the corresponding part of the parietal layer was similarly affected. In four cases there was some opacity, but no effusion, at the upper part of the membrane, a lesion regarded by LOUIS as antedating the typhoid attack. The subarachnoid cellular tissue contained serosity in twenty-eight cases; copious in four but slight in the others, and in some occupying only the occipital sulci. In no case was there adhesion between the arachnoidal layers. The pia mater was injected in a number of cases and remarkably so in eleven, in most of which the upper cerebral veins were distended; in one case some air-bubbles were observed in these veins.

The CEREBRUM.—The cortical substance was of a uniform roseate hue in seventeen cases, speckled with blackish points in one case, and in two others darkened almost to violet; the medullary substance was deeply congested in seven cases and slightly injected in thirty-two. In general this congestion of the brain-tissue was proportioned to the injection of the pia mater. The cerebral matter was firmer than usual in six cases, softer than usual in five; but these alterations had no relation to existing conditions of congestion. LOUIS hence concluded that increased firmness represented merely physiological differences in the tissues of the organ, but that diminished consistence, which was more distinctly marked, might be considered a morbid lesion analagous to the softening found in many cases in the liver and heart. No serosity was found in the third ventricle in any of the cases; in the lateral ventricles there was in six cases no effusion, in twenty-eight slight effusion and in twelve several spoonfuls of liquid which in two was turbid.

The CEREBELLUM participated, but not in all cases, in the changes which affected the cerebrum. Similar encephalic lesions and in nearly the same proportion were found in patients who died of acute diseases other than typhoid.

not recorded. In four cases, 139, 175, 183 and 217, in which the brain was reported healthy, there was injection of the pia mater with subarachnoid effusion. Lastly, in three cases in which the brain and its membranes were both mentioned as having undergone alteration, there was in 299 effusion into the subarachnoid spaces and ventricles, with congestion of the brain-tissue, in 379 some exudation on the arachnoid, with engorgement of the brain-substance and distention of the lateral ventricles with blood-tinged serum, and in 303 lymph at the base of the brain, with injection of the membranes and turbid serum in the ventricles.

The BLOOD was found in an unusually fluid condition in the *typhoid* case 25, in the *malarial* case 70, in the *typho-malarial* cases 96 and 264 and in case 150 of the *mixed* series; in 204 of the last series the blood was said to have contained few white corpuscles.

ŒDEMA was noted in few cases: the neck was affected in 12 and the legs in 36 of the *typhoid* series; the lower extremities in 70 and 78 of the *malarial* series; the hands and feet in 346, and the body generally in 307 of the *mixed* series.

PURULENT INFILTRATIONS AND DEPOSITS.—In one of the *typhoid* cases, 38, pus was deposited in the greater pectoral muscle and in the knee, elbow and wrist joints. The articular cartilage of the knee was destroyed and the joint and synovial bursa filled with lymph and pus in 289 of the *malarial* series. Purulent deposits were found in several of the *mixed* series: Within the sheath of the rectus abdominis in 151; in the abdominal walls in 244; in the subperitoneal cellular tissue on the left side a little below the diaphragm in 199; in the muscles of the arm and shoulder in 253; in the pectoral region opening into the pleural sac in 383; along the track of the psoas magnus in 382; between the muscles of the lower extremities in 125; in the right buttock, communicating externally by a small aperture near the anus, in 185, and in the prostate in 239.

EXTRAVASATIONS OF BLOOD IN THE VOLUNTARY MUSCLES.—Blood-clots were found within the sheath of the rectus abdominis in 248 of the *malarial* series, in 63 of the *typho-malarial* and 157 of the *mixed* series; the upper third of the muscle was affected in 63, the lower third in the others. To these may be added 136 of the last-mentioned series, in which the anterior abdominal wall was said to have presented contusions and subperitoneal blood-clots, and 98 of the *typho-malarial* series, in which an emphysematous and engorged condition of the tissues of the left side of the neck was believed to have been the result of an ante-mortem blow.

PETECHIAL OR ECCHYMOSED SPOTS OR BLOTCHES on the skin were noted in the *post-mortem* records of two of the *typhoid* cases, 36 and 45; but in six others the clinical history refers to their existence during the course of the disease: Thus, in 5, 21 and 49 there were petechiæ on the chest, abdomen and thighs; in 16 a few minute reddish spots which did not disappear on pressure; in 2 blotches on the face, abdomen and chest, and in 34 vibices on the abdomen. In eight of the *malarial* cases, 260, 261, 289, 292, 293, 295, 386 and 387, the surface of the trunk or of the body generally was more or less ecchymosed; in 292 and 293 the skin was reported also as dingy or bronzed. Of the *typho-malarial* series 273 is the only case in which the record notes the *post-mortem* appearance of spots of this character, in this instance situated on the abdomen and chest; but the clinical history of 86 and 114 indicates their existence, while that of 93 shows the body generally, except the face and neck, covered with vibices. In the *mixed* series of cases only nine instances were recorded of ecchymosed or purpuric spots on the skin. In two of these, 205 and 235, the clinical history is the source of the information that ecchymoses appeared on the chest and abdomen. In the others the *post-mortem* records show diffused ecchymoses on the body in 201, a few faint reddish spots or petechiæ on the chest or abdomen in 202 and 203, purpuric spots in 351, 354 and perhaps 303, and a purple pustular eruption in 334. Petechiæ were noted on the epigastrium in the *typhus* case 389.

BED-SORES formed on the back and hips in cases 5, 23 and 34 of the *typhoid* series, in 289 and 366 of the *malarial* series and in 101 of the *typho-malarial* series; in the last case they were developed also over the angles of the ribs on the right side. In the *mixed* series the clinical history of 117 and 166 states that the skin over the sacrum became red and painful, manifesting a tendency to slough; in 125, 199 and 300 large sores were developed over the sacrum and trochanters, and in 218 the skin is said to have been excoriated and denuded.

GANGRENOUS SPOTS appeared on a blistered surface in case 93 and in connection with parotitis in 103 of the *typho-malarial* series.

GANGRENE OF THE FEET is recorded in six of the cases: 278, a *malarial* case in which amputation was performed at the metatarso-phalangeal articulations; 112, *typho-malarial*, in which amputation was effected by the circular method above the ankle, and 138, 143, 163 and 164 of the *mixed* series. In all the cases both feet were affected; in the three first mentioned the condition was attributed to frostbite.

SUPPURATION IN THE EAR occurred in many cases, but in 56, *typho-malarial*, it appeared to be intimately connected with the fatal event.

ULCERATION OF THE CORNEA was mentioned in but one case, 49, of the *typhoid* series.

In connection with the above the following abstract of a synopsis of autopsies in thirty-five typho-malarial cases is submitted. The examinations were made by Assistant Surgeons H. ALLEN and GEORGE M. MCGILL, U. S. Army, at the Lincoln hospital, Washington, D. C., during 1863 and 1864. The report was filed in the Surgeon General's Office.

The SKIN was jaundiced in two cases, affected with erysipelas in four cases and with eschars in eight. The cellular tissue of the neck was emphysematous and the skin of the part greenish in one case. This condition was found in eight cases of death from other acute diseases; and in some of these the emphysema was general, but specially marked in the intermuscular septa of the lower extremities. As the heart and liver were softened in all these cases and the latter organ itself emphysematous in three, LOUIS attributed the condition to a morbid change in the fluids of the body.

The VOLUNTARY MUSCLES were healthy in all of the forty-six cases.

but the general results of the observations were published in the *American Journal of the Medical Sciences*.* It may be stated that most of these cases are to be found in the *post mortem* records that have just been analyzed.

In one case the *fauces* and *epiglottis* were covered with diphtheritic membranes, the margins of the epiglottis and lining of the *larynx* ulcerated; in another there was thickening of the membrane but no ulceration. In one instance the *trachea* was decidedly inflamed, but without coincident laryngitis or pneumonia. The *œsophagus* and *pharynx* were healthy in twenty-seven cases, inflamed in three and ulcerated in five. Several of the ulcers were covered with a greenish exudation, and two, which had perforated the mucous coat, exhaled a gangrenous odor. In one of the cases of inflammation without ulceration an abscess about the size of a hazelnut was found where the tube is crossed by the left bronchus.

The *lungs* were mottled in every case, owing to the deposit of black pigmentary matter; congestion was found in fifteen and red hepatization in ten. Under the heading of congestion is embraced every variety of engorgement from simple excess of blood to a turgidity of the parenchyma, absence of crepitation and the presence of an excessive amount of sero-sanguineous liquid; all the specimens on section gave issue to a thin dark-red and frothy fluid. This condition differed from splenization, as under pressure the lung collapsed when the liquid was expressed, while a splenified lung would break down when subjected to this treatment. But splenization was frequently found associated with this sero-sanguineous engorgement. In three of the ten pneumonitic cases both lungs were affected and in seven one only; of the latter two were on the right side and five on the left. One case was tuberculous, one showed capillary bronchitis and the remaining eight were normal. *Pleurisy* was observed in three cases, in two of which it was simple and in the other complicated with pneumonia.

The *heart* was generally pale; in twenty-nine cases firm and in six soft. It contained clots in all except three cases, and the larger clots were invariably associated with pneumonic complications. Pericardial adhesions were found in two cases; the quantity of effused liquid varied from one fluid drachm to three fluid ounces.

The *liver* was firm in twenty-four cases and flabby in eleven, but three were fatty, four congested and two bronzed. Bile was generally present, in quantity from two to twenty fluid drachms. It was usually black, thick and tar-like, occasionally dark-greenish, brown or ochre-colored, and in other cases of a more yellowish tinge. While frequently viscid it was sometimes thin, with a light flocculent deposit.

The *spleen* in twenty-one cases was firm and healthy; in fourteen flabby or pultaceous. It was generally grayish-purple externally and bluish-gray or dark-brown internally. In some the softening was so extreme that the organ would break under the handling necessary to remove it from the body, and when squeezed the pulp would flow out in a thick continued stream as from a sponge.

The *intestines*.—In twenty-eight cases the morbid conditions were confined to the *small intestine;* in seven the colon was also involved. The mucous membrane was more or less softened, and in protracted cases of illness its folds in the lower third of the ileum were obliterated. The parts immediately around the ileo-cæcal valve were uniformly the seat of greater pathological changes than elsewhere. From this point the glandular evidence of disease extended several feet up the canal, in one instance reaching the distance of ten feet above the valve. No ulceration was detected above the jejunum. The greater lesions were invariably observed in the closed glands. These in the earlier stages were tumid, thickened, of a whitish color, with high abrupt walls. Of the whole number of specimens eighteen presented ulceration in tumefied patches; fourteen in patches not tumefied: in three the condition of the patches was unnoticed. The character of the ulcer varied as it existed in the swollen or the shrunken gland: In the former its walls were high, its base red, its form generally circular or sub-oval, with occasionally a low form of exudation on its surface. This form was never confluent, and in no instance was the entire surface of a patch the seat of ulcerative change. Several distinct ulcers, however, were seen in one patch, and in three instances the whole area was pitted with punctate ulcers, giving the gland a honey-combed appearance. This condition of the agminated glands was always accompanied with a similar change in the solitary follicles: the enlarged follicles were frequently so numerous as to give the surface of the gut a mammillated appearance. In the shrunken gland the ulcers were always of a duller hue, the walls seldom high, and if so, only in the periphery of the affected patch, forming a rounded subeverted border, the area within constituting the ulcer. The base was chiefly of a dark-brownish color, due to the presence of pigment. The form of the ulcer was, as a rule, irregular, a condition resulting from the unequal ravages of the undermining process which had taken place at the base of the individual follicles. In eight cases the borders of the patches were scooped out to the depth of a line by this action; in two perforation of the intestine had taken place in ulcers near the ileo-cæcal valve, and in both of these peritonitis was extensive. The *colon* was congested in seven cases, in four of which there was follicular enlargement and in three ulceration; in one case its mucous membrane was thickened and its solitary glands ulcerated, and in another, in which the immediate cause of death was hemorrhage, large quantities of blackberry seeds were found in the actively inflamed tissues of the alimentary canal.

Gluteal abscess was observed in one case. The parotid glands were inflamed in six cases, in two of which suppuration was noticed. Inflammation of the thyroid gland with thyroid apoplexy and abscess of the salivary glands was observed in one case. In another an abscess containing a drachm of healthy pus was detected in the cellular tissue beneath the diaphragm at the epigastrium.

The scattered facts presented by the records of individual cases having been, for con-

* Vol. XLIX, p. 126 *et seq.*

venience in study, consolidated in the above analytical summary, some remarks suggested by their consideration, and references to matters of interest untouched upon in the analysis, are herewith submitted.

II.—THE ALIMENTARY TRACT AND ABDOMINAL VISCERA.

THE SALIVARY GLANDS.—The parotid gland was inflamed in 4.1 per cent. of the cases. No predilection was shown for either side, and in several instances both glands became involved. In some cases the inflammation subsided after a continuance of many days; but in the greater number purulent infiltration speedily resulted. As an illustration of the rapidity with which this was effected case 31 may be instanced,—the gland was observed to be swollen on the eleventh day of the month, and on the fourteenth, when death occurred, disorganization had already taken place. In 222 the matter escaped by the ears; in 193 by apertures in the mouth between the root of the tongue and the inferior maxilla, and also externally a little below the mastoid process. Parotid swelling occurred only after a prolonged attack of fever, and was recorded among the malarial as well as the typhoid cases. It must therefore be considered a result not so much of the direct action of the fever-poison as of the lessened vitality and deteriorated condition of the blood produced by the continuance of the febrile state. Its occurrence in the later stages of typhus* also indicates its independence of a specific febrile cause. The frequency of parotid swelling in the continued fevers of the war, as compared with those of civil life, has already been noticed in the section on symptomatology.† It seems of interest as one of several morbid phenomena that occurred in our camp fevers intimating a tendency to typhus, or rather to a return of the clinical features that characterized the fevers of the unsanitary camps, ships and prisons of the middle ages. The rarity of notable inflammation of the submaxillary (suppuration having occurred in this gland in but one case, 384) or sublingual glands or of the pancreas was in marked contrast with the frequency of these parotid abscesses. HOFFMANN‡ ascribes the destructive character of the inflammation in the parotid after typhoid to peculiarities in the anatomical situation of the gland. The density and inelasticity of its fascia and the bony structures among which it is embedded prevent expansion during the congestion and corpuscular accumulation attending the process, so that impaction and necrobiosis are more readily produced. But although this is true in part, and corresponds with our knowledge of inflammatory results in similarly situated localities, as in the familiar example of paronychia, the febrile poison appears to exercise a certain influence on the progress of parotid swellings in view of the infrequency of suppuration as a result of the inflammatory condition in mumps.

That the PHARYNX and ŒSOPHAGUS were not more frequently observed to have suffered from inflammatory action appears due to the fact that their condition was seldom examined by our medical officers. Dr. HARRISON ALLEN's notes afford the only data for estimating the frequency of their morbid appearances. The mucous membrane was normal in twenty-seven of his thirty-five cases,—when altered its changes were such as have been recorded by LOUIS in his typhoid cases; it was inflamed in three and ulcerated in five. The *post-*

* MURCHISON, p. 216, reports the appearance of parotid swellings in 211 of 14,676 patients admitted into the London Fever Hospital in the ten years 1861–70, and refers to their presence in the typhus of military writers, as noted by MONRO in the British army operating in Germany in 1761 and by JACQUOT in the typhus of the French army in the Crimea.

† See *supra*, p. 298.

‡ *Untersuchungen über die Pathologisch-Anatomischen Veranderungen der organe beim Abdominaltyphus.*—C. E. E. HOFFMANN, Leipzig, 1869, p. 189.

mortem records presented above show in addition the occurrence of ecchymoses, diphtheritic exudation and abscess.

The observations on the STOMACH were not numerous. This organ was altered in appearance in 75 per cent. of sixteen typhoid cases, in 51.7 per cent. of twenty-nine malarial, in 62.5 per cent. of sixteen typho-malarial, and in 50 per cent. of seventy-four mixed febrile cases. In most of these there was more or less congestion, sometimes general, at other times circumscribed in patches and in a few cases punctiform; this was often associated with softening and thickening of the mucous membrane and in three cases with ulceration. The ulcers were minute and situated along the small curvature in 386, near the middle of the large curvature in 354 and near the pylorus in 96. These hyperæmic conditions are essentially the same as those found by LOUIS in his typhoid cases, and considered by him to be of secondary importance as he had encountered them in death from acute diseases other than typhoid fever. But it is evident that the changes found in the malarial series of continued fevers were occasionally of a more intensely congestive character than those of the typhoid series; ecchymoses and thorough disintegration of the mucous lining of the stomach, which was filled with a dark grumous liquid, may be mentioned in illustration. Similar conditions were observed in the cases submitted in the last chapter as belonging to the paroxysmal fevers. There appears, therefore, some warrant for referring them to the presence of the malarial poison when they are discovered in certain cases of the typho-malarial and mixed series.

The condition of the lining membrane of the DUODENUM was seldom specially recorded, but when noted in the typhoid cases the lesions were similar to those observed by LOUIS and regarded by him as of minor importance since they had been found with equal frequency in other acute diseases. The duodenum was seldom affected alone; generally it participated in the morbid affection of the stomach. Thus both of these portions of the alimentary tract were inflamed in 29, 116 and 354, ulcerated in 96, and disintegrated in 71 and 243. When only a part of the duodenum was affected the morbid action was restricted to the upper third; and even when the whole of this portion of the canal was implicated the jejunum was frequently, as in 317, healthy. On the other hand there occurred some cases, as 276 and 354, in which the duodenum was affected while the stomach was considered in a healthy condition; in these the morbid action had extended from below. Brünner's glands were noted as enlarged in some instances and in one case, 307, as ulcerated.

The JEJUNUM was mentioned with sufficient frequency to show that it became altered by the extension of the diseased action from below and not from above.* The lowest part of the tube was affected when only one portion was said to have suffered, and when the whole was implicated the action in its lower part was more diffuse and intense than in its upper. In addition to congestion there was sometimes a softened and thickened condition of the membrane with enlargement of the solitary glands, and in rare cases ulceration. In many instances, however, in which the record states only an ulcerated condition of the small intestine, it is probable that the ulceration affected the jejunum as well as the part of the canal lying below it.

INTUSSUSCEPTION of the small intestine was occasionally found, but not with the frequency recorded by LOUIS in his typhoid cases. It cannot be regarded as having a special

* HOFFMANN—*Op. cit.*, p. 96—says that he has but seldom found disease of the jejunum in typhoid; that when it does occur it is extremely rare for its upper portion to be involved, and that the duodenum is exempt in a still greater degree.

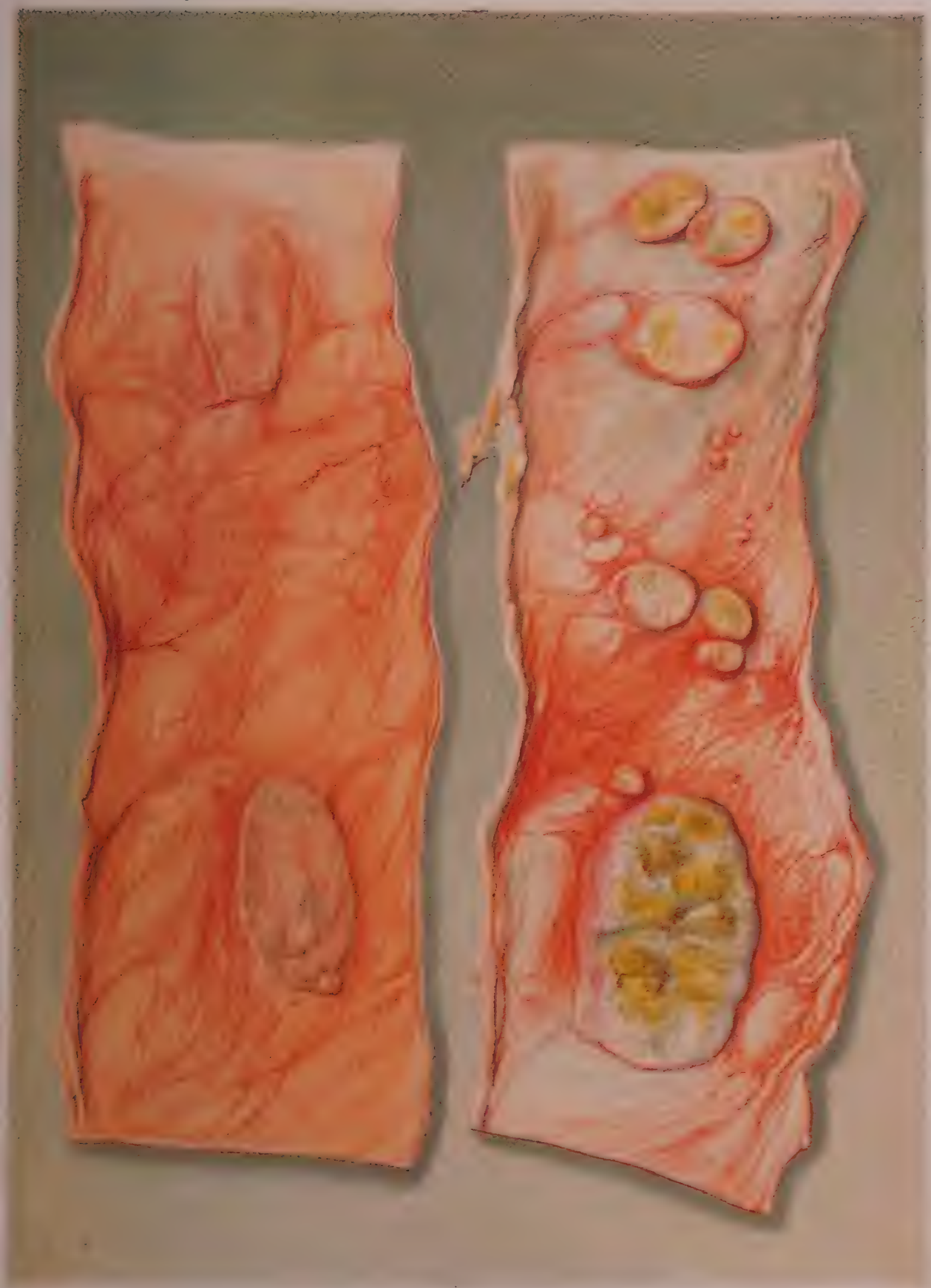
relation to the febrile cases, as it was found with perhaps equal frequency in the diarrhœal series.*

Lumbricoid worms were also noted in a few cases, but it does not appear that they had any special connection with the continued fevers.† In 378 a worm crawled into the larynx of the patient and caused death by suffocation. Specimen 290, Army Medical Museum, exhibits this worm extended in the larynx, trachea and right bronchus. In 348 the intestinal canal was extensively colonized.

A tumefied, inflamed or ulcerated condition of the patches of Peyer or deep and circumscribed ulcerations of the intestine which, in view of our knowledge of the typhoid intestinal lesion, might be ascribed to the destruction of these patches, were found in all the cases of continued fever except those that have been separately presented as probably due solely to the action of the malarial poison and two of those that were regarded clinically as typhus. It is evident that the glands in the vicinity of the ileo-cæcal valve were especially prone to become affected, for in some cases it is stated that the diseased action was in progress only in those occupying the lower part of the ileum; while in cases in which the whole of the intestine was involved the ulcerative process had made greater progress in the glands near its termination than in those of the jejunum. This is illustrated by many of the specimens that have been preserved in the Museum. Three, four or more pieces from different convolutions of the same ileum invariably show a progressive increase of the diseased action as the ileo-cæcal valve is approached. Thus the seven successive portions of the ileum constituting specimens 171–177 present the most gradual transitions from the slightest thickening of Peyer's patches in the first piece to the large ulcerations just above the valve in the last. Thus also the five portions of the ileum, specimens 376–380, present from above downwards a gradual enlargement of the agminated glands, the summits of which are more or less ulcerated in the last three pieces; many of the solitary glands are also diseased, forming in the lower pieces oval, ulcerated elevations similar in character to those in the patches of Peyer but smaller in size. The plate facing this page, prepared from a water-color drawing of the fresh intestine, reproduces the appearance of the second and last of these specimens. The section of the intestine on the left side, taken from high up in the ileum, shows two of Peyer's patches somewhat thickened, rising from the surface of the mucous membrane with abrupt edges, the lower decidedly thicker than the upper, but neither ulcerated: the tawny-yellow mucous membrane is considerably injected and a few slightly enlarged solitary follicles are scattered over its surface. The section on the right side of the plate, taken from just above the ileo-cæcal valve, shows in its lower part a large patch much thickened, with abrupt edges, its surface ulcerated and stained with biliary pigment; eight similar but smaller ulcerations of various sizes seem to have originated in the solitary glands, and a number of these glands are enormously enlarged but not ulcerated; the pale cream-colored mucous membrane is highly injected in patches, which appear as irregular red stains. The case from which these specimens were obtained is given as 336 of the *post-mortem* records.‡ Prints from negatives of the mounted specimens are submitted (facing pages 410 and 412) for comparison with the chromo lithographs of the fresh intestine.

It is also evident that the diseased action had a progressive upward movement, for in but few instances were the upper glands affected while those below were in a healthy con-

* See p. 313, Part Second of this work. † See *infra*, p. 591. ‡ See *ante*, p. 410.



dition. In case 296 there were thirty-two patches of Peyer varying from half an inch to three inches in length, and twenty-seven of these were much thickened and generally inflamed but not ulcerated; the first two patches of the series were not thickened; a large patch dotted with black pigment but otherwise healthy was found on each fold of the ileo-cæcal valve, and the next patch above these appeared to be healthy. In another exceptional case, 200, the twelve upper patches were healthy, the thirteenth ulcerated, the fourteenth healthy and the remainder ulcerated and sloughing, some even through to the peritoneum.

The affected patches in the continued fever cases were usually circular or oval, from half an inch in diameter to three or four inches in their longest measurement, that parallel with the long axis of the tube. Occasionally, however, they were of unusual size. Thus specimen 399, Army Medical Museum, from case 198, exhibits in the ileum immediately above the ileo-cæcal valve a patch eight inches long, the upper extremity of which is covered with minute ulcerations.

The thickening of the patches varied from a just perceptible tumefaction, such as is seen in the upper part of specimen 377, to a prominent node rising gradually from the surface of the surrounding mucous membrane; but in many instances the margins of the nodes, as seen in the plate of specimen 380, were abrupt, and in some, as in 565 (see plate facing page 380), the patches were so constricted at the base as to present the appearance of flat sessile fungoid growths. The enlargement was opaque, soft and of a white, yellow or grayish color, more or less reddened by congestion. In some the mucous membrane covering the patch presented a slightly reticulated appearance from the irregularity of the underlying surface; this is well seen in the lower part of specimen 377, as shown in the photographic print.

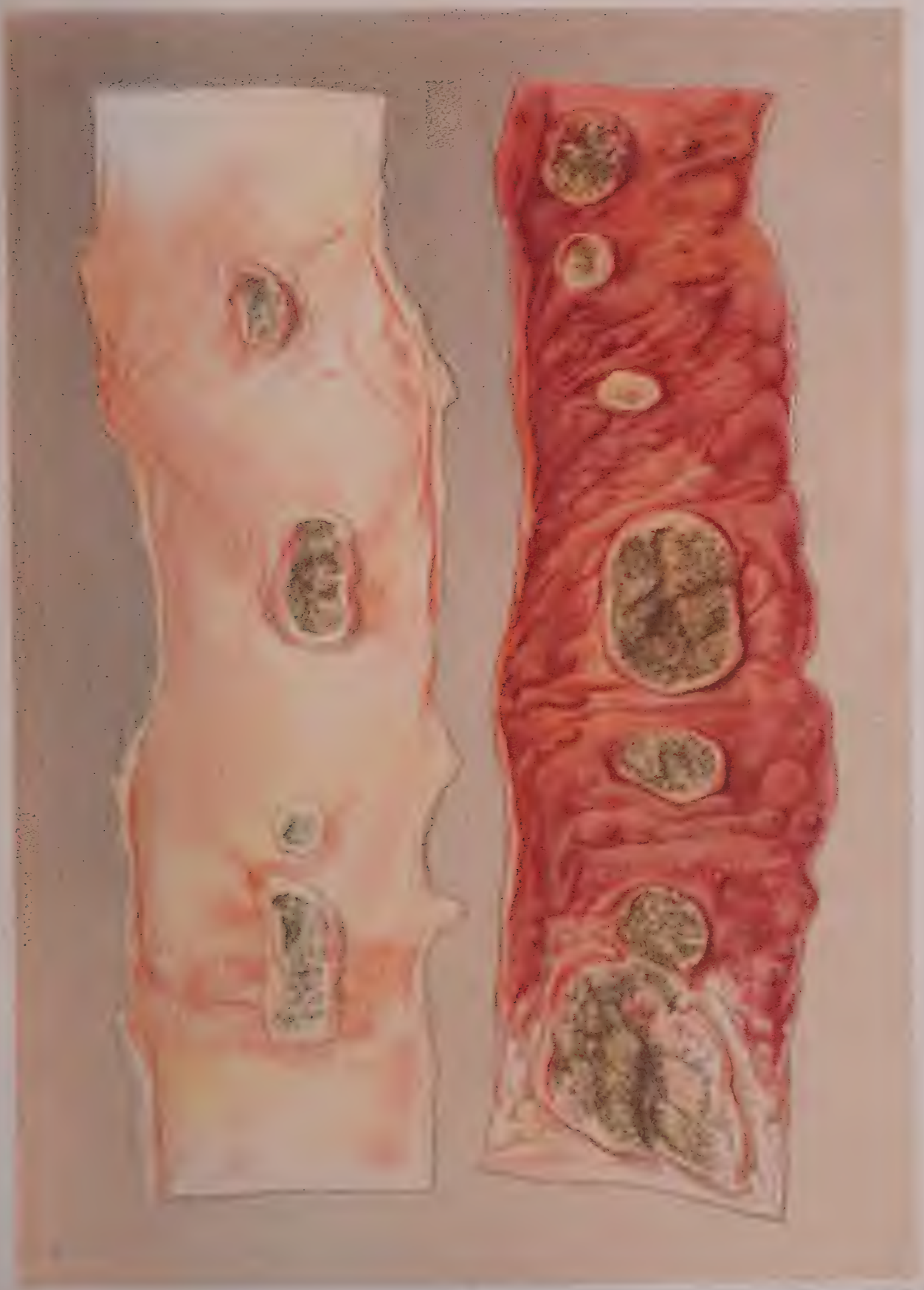
When the morbid action had made further progress in such plaques, ulcers appeared on the prominences and afforded escape to the softened and broken-down portion of the contents. These ulcerations became enlarged by the destruction of the interlying glandular and mucous tissue and the coalescence of adjoining ulcerations until the greater part or whole of the node was removed, leaving a shallow cavity containing the remains of the glands and the infiltrated submucous tissue usually stained of a dark or greenish color by the intestinal contents. Patches seen in various stages of this destructive process presented a variety of appearances: In some a few minute ulcerations on the apices of individual glands; in others one or more larger ulcerations at some points, with the remaining surface intact or only minutely penetrated; and in others again a large irregular ulcerated surface more or less stained and perhaps bridged in part or overlaid by fragments of the softened mucous covering. The edges of the completed ulcer were sometimes ragged from the persistence of shreds of the mucous membrane, but generally they were well defined by a thickening of this membrane and its underlying tissue. Some of these appearances are admirably shown in the chromo-lithographs of specimens 177, 185 and 189, Army Medical Museum, herewith submitted. The first of these has already been referred to as one of seven successive portions of the ileum showing a gradual transition from the slightest thickening of the patches of Peyer in the upper part of the canal to extensive ulceration in the lower part. It is from the case of a soldier of the 6th Pennsylvania Cavalry who was admitted into the Judiciary Square hospital April 26, 1863, and died May 2. The details of the case were not furnished. The chromo-lithograph facing page 440 represents the ileum in the vicinity of the ileo-cæcal valve: the mucous membrane is reddened by congestion except near the valve,

where it is grayish, with occasional stains of brownish pigment: the patches of Peyer and several of the solitary glands are thickened and ulcerated, the contour and surface of the ulcers being irregular from the imperfect destruction of the overlying mucous membrane.

The specimens 185 and 189, plate facing this page, were taken from a soldier who died of fever in the Finley hospital, Washington, D. C., during the summer of 1863. His history was not recorded. The left piece, representing a portion of the upper part of the ileum, shows four typhoid ulcers, two evidently based on Peyer's patches and two apparently on diseased solitary glands. A number of slightly thickened follicles are scattered under the cream-colored mucous membrane, which is lightly streaked with an arborescent redness. The contour of the ulcers is irregularly rounded or oval, their surfaces dark colored with a greenish tinge and their edges thickened and pale but in parts somewhat injected. The right piece, taken from just above the ileo cæcal valve, shows two large ulcerated Peyer's patches and five ulcers apparently due to disease of the solitary glands. The mucous membrane is thickened, of a livid crimson color and raised at several points into small rounded elevations by enlargement of the solitary crypts. The contour of the ulcers is irregularly round or oval, but in some of the smaller lesions the long diameter is at right angles to the axis of the tube. The surface is stained of a dark-green color, but in the lowest, the largest ulceration, there are some spots of reddish congestion. The edges are abrupt and thickened and participate more or less in the dark injection of the mucous lining.

In many cases, however, some of the ulcers, particularly in the lower part of the ileum, extended through the submucous tissue and exposed the transverse fibres of the muscular tunic in the bottom of the cavity. In many cases, also, the muscular coat became involved in the process of disintegration, and the serous covering of the intestine gave way at the weakened point. But in a small proportion of the cases the nodes, instead of breaking down in this gradual manner, sloughed away *en masse*: or a part of the thickened patch became subject to progressive ulceration while another part was removed by sloughing. The patches are sometimes stated in the record to have been converted into soft pultaceous sloughs. Thus in cases 13 and 14 of the typhoid series the so called typhoid deposit was removed by sloughing, as also in cases 200 and 385 of the mixed series. In 200, according to the record, one of the patches of Peyer was converted into a blackish-brown irregular eschar one and one-fourth inches square and one-fourth of an inch thick. In 385 the patches were blackish in color, marked with livid-red and their margins indistinctly defined. Photographic prints of a portion of the ileum in each of the last two cases accompany this report, facing pages 388 and 418. The first, representing specimen 241, Army Medical Museum, shows a large irregular pulpy slough, its transverse diameter measuring three inches and its longitudinal diameter one inch and a half; several small shallow ulcerations may also be observed on the specimen. The second, representing specimen 182, shows a large, thickened, sloughing patch, several oval ulcers based on the solitary glands being also present. When the destructive process was effected in this rapid and general way the tendency to perforation was obviously increased.

In the analysis given above of the *post-mortem* records of the series of fifty pure typhoid cases there is ample ground for the assertion that the mucous membrane of the small intestine was affected chiefly, and not unfrequently solely, over and immediately around the tumefied or ulcerated patches of Peyer. The absence of a general congestion of the mucous membrane in some cases proves that its presence was not essential to the



diseased condition of the glands. Their affection must therefore be considered the primary lesion, and any extension of inflammatory processes to the general mucous surface must be regarded as secondary and as much a consequence of the morbid action in the glands as its extension to the serous membrane after the destruction of the muscular tunic. This secondary congestion of the membrane between the ulcerated patches was usually confined to the lower part of the ileum, where the diseased action had made most progress. In some cases, however, it was more generally diffused, but in these it was invariably, so far as the records show, less intense in proportion to its distance from the ileo-cæcal valve. Specimens from some of the cases of this series, as from 10, 43, 48 and 50, were received at the Museum and have been preserved, but unfortunately none of them were submitted to the artist for the preservation in colors of their appearance when recent. Nevertheless the absence of a diffuse congestion of the mucous membrane in the vicinity of typhoid ulcerations, at least in the upper part of the ileum, is shown by the chromo-lithograph of specimen 185 on the left side of the plate facing page 438. As the history of the case from which this specimen was obtained is not on record, it is uncertain whether it was or was not modified by a malarial element. But even had the case been so modified the value of the drawing as an illustration of typhoid ulceration, unaccompanied by diffuse inflammation of the lining membrane, is by no means impaired. As will be seen directly, a diffusely congested or inflamed condition of the membrane was more frequently met with in modified than in unmodified cases; hence, while the general congestion of 189, shown on the right side of the same plate, may be viewed as due to a malarial complication, the absence of a similar congestion in 185 cannot be ascribed to an interference of that nature.

In the malarial series of continued fever cases presenting adynamic symptoms the condition of the patches of Peyer was not reported in twenty-six instances; and as in most of these some details are given of the appearances presented by the mucous membrane of the small intestine, it may be inferred that the patches were not so altered as to attract special attention, or in other words, that they or the membrane covering them were healthy, congested or inflamed according to the condition of the general mucous lining. They were healthy in seven cases and not ulcerated in two cases, although in six of these, 257, 260–263 and 367, the membrane was more or less congested or inflamed, and in the last-mentioned case ulcerated at one point to perforation. When special attention was given by the reporters to the condition of the patches they were generally said to be reddened or altered in color by deposits of black or bluish pigment: They were reddened, congested or inflamed in ten cases, in four of which the state of the mucous membrane of the small intestine remained unnoted, while in six it was more or less hyperæmic; it is to be observed also that in one of these cases, 373, contrary to what is found in typhoid fever, the glands and mucous membrane of the upper part of the intestinal tract were the seat of the congestion. In case 84, in which the agminated glands were reported pale, the mucous membrane of the small intestine, although showing some streaks of congestion, was generally bloodless. In 386 most of the glands were healthy, but a few were inflamed and slightly thickened, while the ileum was inflamed in patches, some of which were intensely affected. In 387 the glands were opaque-white and slightly thickened, but did not appear positively diseased, and the mucous membrane generally was of a pale-cream color. In the remaining fifteen of the sixty-three cases the patches of Peyer were colored by deposits of pigment, which will be more particularly referred to hereafter.*

*See *infra*, p. 455.

The mucous lining of the ileum was congested in nearly two-thirds of the cases of this series. In some the congestion formed streaks and patches, and in these there appeared no marked partiality for the lower part of the intestine; generally, however, the congestion was diffused throughout the whole of the ileum. The mucous membrane was frequently darkened by the intensity of the engorgement and occasionally spotted with ecchymosis; in one instance the ileum is said to have been gangrenous; nevertheless ulceration was rarely present. In a few cases the membrane was softened, thickened or thinned. In some it is stated that there was no congestion of the membrane, and in others the absence of any statement with regard to its condition, although the changes in its glands were noted, leads to the belief that it was not materially affected. In fact the condition of the mucous lining of the ileum in these continued malarial fevers did not differ from that found in the paroxysmal malarial cases submitted in the preceding chapter. The hyperæmia of the membrane in the malarial series differed from that met with in the typhoid cases not only in its greater extent and intensity but in its mode of development. In the latter it was a secondary result of the morbid action in the closed glands; in the former, on the contrary, it must be regarded as a direct result of the virulence of the febrile cause,—a primary lesion because unconnected with any antecedent focus of inflammation. The agminated and solitary glands were frequently healthy or participated only in the general congestion. In one exceptional case the gut was perforated, but usually no circumscribed areas of special activity appear to have been developed, although the engorgement was such that in two cases ecchymotic blotches, and in one gangrene, were recorded as its consequences. In fact, while the inflammation in the typhoid cases was confined to the glands, penetrating deeply on account of their anatomical relations, and spreading laterally along the continuity of the membrane to but a limited extent from these primary foci, the hyperæmia in the malarial cases was general and primary, differing as much in appearance and distribution from that in the typhoid cases as the developments on the skin in erythema or erysipelas differ from those in small-pox during its period of maturation.

In the sixty-one cases of the typho-malarial series the patches of Peyer were tumefied and more or less congested, as in the earlier stages of the progress of typhoid fever in twenty-one instances. They were ulcerated, as in the later stages of typhoid, in thirty cases; in some of these, as 56, 93, 110 and 298, they were in process of healing, while in one 92, their disorganised condition is suggestive of that removal by sloughing which has been mentioned as occasionally occurring. In ten cases in which the condition of the patches was not entered on the record, the ileum or small intestine was congested or ulcerated and in several instances perforated. Deposits of black pigment were found in some of the glands in three of these typho-malarial cases.

In this series the mucous membrane of the ileum, exclusive of that covering the affected glands, was generally congested or inflamed throughout its whole extent; but in a few cases the hyperæmic condition was confined to its lower portion, and in one it was reported as forming only an areola around each enlarged and ulcerated patch. In a few cases, also, softening, thickening, thinning or pigmentation was noted.

Conditions of the mucous membrane and patches of the ileum similar to those observed in the typho-malarial cases were found in the mixed series. Some difference in the frequency of certain observations may, however, be noted. Thus, it has been seen that twenty-one of the sixty-one typho-malarial cases proved fatal at a time when the disease of the agmi-

ULCERATED PEYERS PATCH.-FE

nated glands had not advanced beyond the stage of hyperæmia and tumefaction. Death occurred in these modified typhoid cases at an earlier period of the typhoid career than is usual, and this result must be ascribed to the influence of a concurrent and probably antecedent malarial fever. But only twelve of two hundred and thirteen cases of the mixed series are reported as having presented tumefied but unulcerated glands. This accords with our knowledge of the constitution of this group of cases. It consisted of pure and modified typhoid cases in unknown proportions, but the proportion of coincident malarial fevers was necessarily less than in the typho-malarial series, in which every case was modified by a malarial complication. The relative infrequency of unulcerated patches of Peyer in the mixed series of cases may thus be readily understood.

The LARGE INTESTINE was recorded as more or less altered from the normal or healthy condition in 35.4 per cent. of the typhoid cases, 68 per cent. of the malarial and in 51 per cent. of the typho-malarial and the mixed series of cases. These figures, however, express only approximately the relative frequency of the implication of the large intestine, as in many cases in which its condition was not stated there is an uncertainty as to whether or not it was examined. The appearances indicated that congestive or inflammatory processes had been in progress during the fatal sickness or at some period shortly anterior to it. The mucous membrane was reddened in erythematous patches or more diffusely and deeply congested. The latter condition was frequently found at or near the extremities of the gut; the former in the intermediate parts. With or without this congested condition in their vicinity the solitary glands were in many instances observed as prominences sometimes as large as small shot and frequently ulcerated. Occasionally the presence of larger ulcerations was recorded, but whether these were based upon the glandular substance or a result of the inflammation of the membrane independent of the condition of its crypts is uncertain.* In some, however, as in case 23, it is said that the ulceration was unconnected with the state of the solitary glands. Sometimes the more deeply congested parts were spotted with ecchymoses, and in a few cases the canal contained extravasated blood. Those parts of the mucous membrane that were but slightly congested were frequently mottled with patches and streaks of a slate-gray, bluish, greenish or other dark color. Frequently, also, and particularly in these cases of mottling, the solitary glands, whether prominent or not, presented points of black pigmentary deposit in their apices. In a few cases softening with thickening, or rarely thinning of the mucous membrane, was recorded. Ulceration without specially noted congestion appears frequently in the reports of the typhoid cases, while congestion without ulceration seems to have characterized the majority of the malarial cases. Only 30 per cent. of the large intestines that were observed in the typhoid series presented congestion without ulceration, while 35 per cent. presented ulceration without particularized congestion; but in the malarial series 63 per cent. showed congestion without ulceration, while only 16 per cent. were ulcerated, and the mucous membrane in these was inflamed, ecchymosed, congested or mottled with slate-colored patches.

It may reasonably be supposed that the lesions of the large intestine in a few of the cases were those of diphtheritic dysentery, as for instance in 323, in which the intestine was softened and disorganized; in 80, in which it was said to have been diseased, and in 311 and 316, in which its lower end and lining membrane were reported respectively as gangrenous and converted into a pulpy mass. Dr. WOODWARD has instanced cases 141, 192, 226,

* See *infra*, p. 450.

278 and 800 of his diarrhœal series as examples of the coincidence of typhoid fever and diphtheritic dysentery.

The SOLITARY GLANDS were reported altered from the normal or healthy condition in 26 per cent. of the typhoid cases, 38 per cent. of the malarial, 24.6 per cent. of the typho-malarial and 23.5 per cent. of the mixed series. These figures cannot be regarded as accurate expressions of the frequency of such changes in the glands owing to the obvious imperfection of some of the records. Nevertheless a more frequent involvement in the malarial cases seems to be indicated. This deduction may be accepted the more readily as it has already been shown that in these cases the congestion of the mucous membrane was more diffuse and intense than in unmodified typhoid. Not that the affection of the glands was always associated with existing congestion, for in many instances their tumefaction or ulceration is the only abnormity mentioned, and in the chromo-lithograph of specimen 185, facing page 438, they may be seen enlarged on a mucous surface which is not reddened; but from our knowledge of the histology of catarrhal diarrhœa it is certain that tumefaction of the follicles originates in hyperæmic conditions of the membrane, which at a later period may subside before the glands have returned to their normal condition. Moreover, pigmentation of the glands was more frequently found in the malarial cases than in the typhoid; thus, while in the latter deposits of pigment were reported in but two of thirteen cases in which attention was given to this point, they were noted in ten of twenty-eight malarial cases, in five of fifteen typho-malarial cases, and in nine of fifty-one cases of the mixed series; and, as will be shown hereafter, this pigmentation was dependent on an antecedent congestion.

The records show also, with some uncertainty, however, owing to their occasional want of precision, that the glands of the ileum were more commonly affected than those of the large intestine, and that while the former were altered with nearly equal frequency in all the series of cases the latter appeared more liable to become changed in the malarial than in the typhoid cases. Thus, the solitary glands of the small intestine were in an abnormal or unhealthy condition in 84.6 per cent. of thirteen typhoid cases, in 92 per cent. of twenty-four malarial cases, in 70 per cent. of seventeen typho-malarial cases and in 78 per cent. of fifty of the mixed series; while those of the large intestine were similarly altered in 38.4 per cent. of the typhoid, 62.5 per cent. of the malarial, 35.5 per cent. of the typho-malarial and 40 per cent. of the mixed cases.

LOUIS, while setting aside the changes in the patches of Peyer as peculiar to the typhoid affection, regarded the congested or inflammatory condition of the intestinal lining, including also the enlargement and ulceration of the solitary glands, as of an accidental or secondary character, since he had observed them in cases of death from other acute diseases. In the present section they have been found of even more frequent occurrence in fevers that did not exhibit the specific lesions of typhoid than in those that did, but evidently constituting an essential of the disease in neither of these classes. Dr. WOODWARD,* however, has shown the invariable presence of congestion and the frequent occurrence of an affection of the solitary glands in catarrhal diarrhœa; and since, in the cases of continued fever which were characterized by these appearances, there had invariably been an antecedent diarrhœa, it is not surprising to find that the changes in the solitary glands in these cases were precisely those that have been described as characteristic of the simple diarrhœal affection. In fact the case reported as 300 of the *post mortem* records of the continued fevers furnished the

* Page 126, Second Part of this work.

specimen which was used in the microscopic delineation of the changes in the mucous membrane and its solitary glands in cases of acute diarrhœa,—see, in the Second Part of this work, the steel engraving facing page 326 and the photographic print facing page 328. The patient died of a complicating dysentery associated with a febrile movement of a paroxysmal character.

The plate facing page 380 of the present volume shows the solitary glands enlarged to the size of small peas. The portion of the ileum represented, constituting specimen 565, Army Medical Museum, was taken from near the valve, the case being that reported as 147 of the *post-mortem* records. The patch of aggregated glands in the lower half of the specimen is much and irregularly thickened, and the villi are so enlarged as to give the mucous surface a plush-like aspect. In connection with the marked enlargement of both the solitary and agminated glands in this case, it may be stated that in general the solitary glands in typhoid cases presented characters similar to those of the patches of Peyer, as if they had been involved in the same morbid action; when the latter were largely tumefied, extensively ulcerated or in a sloughing condition, the former were in most instances similarly affected.

But tumefaction and ulceration commencing in the solitary glands of the ileum not unfrequently extended beyond their boundaries. The surrounding mucous and submucous tissues became involved, and by the coalescence of neighboring morbid areas ulcers of comparatively large size were produced. When small the ulcers were round or oval, when large they were less regular in form and not unfrequently their greater diameter lay across rather than along the intestine. Their edges were usually abrupt and their cavities stained like those resulting from the disorganization of the patches of Peyer,—see the chromo-lithographs of the specimens submitted on the right of the plates facing pages 436 and 438.

The morbid action in the solitary follicles of the colon resulted in similar enlargements and ulcerations. In some cases the mucous surface was raised by minute rounded prominences; in others pin-hole apertures, produced by the sloughing of the apices of the glands, permitted their softened stroma with its recent abnormal deposit to be extruded, leaving small cavities in its place; in others again the extension and coalescence of neighboring ulcers gave rise to larger patches of irregular outline, sometimes even an inch in diameter, and in these the muscular coat was frequently exposed. The appearance of the colon when altered by follicular ulceration has been illustrated in the Second Part of this work,—see the photographic prints of specimens 206, Army Medical Museum, facing page 516, and of 195, facing page 526. The former exhibits ulcers varying in size from a mere puncture to a break one-tenth of an inch in diameter, with a series near the centre of the specimen enlarged by progressive ulceration and coalescence to a diameter of over half an inch. The latter shows a more extensive ulceration, which originated apparently in a morbid condition of the solitary glands.

The changes in the minute anatomy of the mucous membrane* in typhoid, whether

*To permit of ready comparison with the statements in the text, a summary of the views and observations of some recent investigators is herewith submitted. ROKITANSKY—*Lehrbuch der Pathologischen Anatomie*, Vienna, 1861, Vol. III—says that two stages may be observed in the typhoid process affecting the mucous membrane of the small intestine. In the first there is an acute catarrhal inflammation of the ileum, chiefly of its lower half; the membrane is injected, its villi turgescent and its agminated and solitary glands visibly enlarged. In the second the hyperæmia is concentrated upon the glands, which become swollen in consequence of exudation and hyperplasia of their structural elements. An injected vascular network surrounds the patches, which are thickened and have an abruptly rising margin; sometimes a constriction around the base gives them a fungus-like appearance. The glands are firm and have a grayish, yellowish or pale-red color, visible not only through the mucous coat but also through the outer layers of the intestine; or they are softer, more yielding and of a darker or bluish-red color. A section of one of these tumefied patches shows a uniform degeneration of its glandular structure and its bed of connective tissue into a marrow-like substance, which invades the overlying membrane, and in some instances penetrates beyond the submucous layer into the muscular coat. This degeneration is the result of an excessive development of the exuded plastic elements. The solitary follicles are in like manner enlarged, firm and surrounded by a vascular zone. The diseased process has two modes of termination—resolution and sloughing. When resolution takes place the swollen glands become less dense and resistant; a grayish opaque liquid replaces the firm

pure or modified, appear to have depended wholly on a condition of hyperplasia. The first of the observed changes was a congestion of the capillaries and small veins, particularly noticeable in the vascular circlets surrounding the closed glands. This was followed by an increase of the lymphoid elements of the adenoid tissue of the mucosa and the submucous connective. These elements accumulated in the mucous membrane between the follicles of Lieberkühn, which were pushed apart, and in some instances occluded, giving rise to the appearance of closed cysts embedded in the prominent mass of the new elements. They accumulated also in the solitary and agminated glands or at particular points in or beneath the membrane, which, when thus raised into prominence by the newly-developed mass, were undistinguishable from enlarged glands. Numerous swarms of these lymphoid corpuscles were found also around the swollen glands or pseudo-glands in the vicinity of the small veins, and disposed in irregular stellate groups corresponding in outline to the serous canals of the connective tissue. Accompanying these aggregations of the corpuscular elements was an infiltration of plasma which relaxed the cohesion of the reticular matrix and increased the size of the lymph-spaces.

The tumefaction caused by this accumulation of the lymphoid elements disappeared gradually, the site of the aggregation resuming its normal aspect as resorption of the plasma and broken-down corpuscles was effected; or the swelling continued to increase until by pressure on the nutrient vessels a necrosis occurred at various points, leading to the development of ulcers varying in size with that of the necrosed tissues. In some instances these ulcerations, beginning as mere points, became extended and coalesced into larger areas by the progressive infiltration of the surrounding tissues and the concomitant interference with nutrition. In other cases in which tumefaction was suddenly developed the whole mass

elements and, after the absorption of this, there remains a slate-gray or black pigmentation of the mucous membrane and glandular plexus. Sloughing of the agminated glands not only involves wholly or in part the membrane covering them, but also other and otherwise normal adjacent tissues through which the typhous product has become diffused. The portion to be thrown off has meanwhile been converted into a yellow or yellowish-brown substance like yellow tubercle, deriving its surface coloring from the presence of bile. The process seizes upon the part uniformly throughout, or frequently distinct portions of a patch are removed by sloughing while other parts undergo a simple resolution. The solitary glands pursue the same course; but they are slower in their progress and their sloughs are small and round. When the muscular coat is involved the peritoneal coat thus laid bare soon becomes gangrenous and peritonitis ensues; even when the muscular coat has not been originally implicated a necrosis of its tissue in layers may take place at a later period and the process extend to the serous coat with the same consequences. Perforation is generally effected at some distance above the ileo-cæcal valve. Sometimes the development of the agminated glands is inconsiderable; the swellings do not rise much above the general surface; they are relaxed, and occasionally their individual cysts become disorganized and burst through the mucous membrane, giving by the numerous resulting depressions a net-like appearance to the surface. In rare cases only a single group of glands attains to an extreme stage of the typhoid process, while in others there is no glandular involvement and the intestinal affection is limited to a catarrh of the mucous membrane. In other cases there are present thick, hard, glandular tumors passing into a fungoid condition at the intestinal surface and accompanied with intense hyperæmia of the surrounding parts, which gives rise to hemorrhage; or in some instances the typhoid matter developing towards the exterior penetrates the muscular tunic and gives origin to a pseudomembranous efflorescence on the peritoneal surface. After the separation of the slough the mucous membrane around the margin of the ulcer sinks to the level of the latter and appears, in proportion to the original thickness of the gland, as a more or less broad, free and movable border, at first rather elevated, red and injected, and afterwards more relaxed and of a dark-gray color. Healing proceeds from the circumference towards the centre; the overlying mucous border unites with the exposed layer of submucous cellular tissue, from which a cell-growth springs up and the surface becomes transformed into a facet having a lustre like that of a serous membrane. Over this the advancing edges of the surrounding mucous membrane are gradually extended, though not with equal rapidity from all parts, until they finally meet. Occasional instances are met with in which a membrane furnished with villi and crypts is found to cover an extraordinarily large area where loss of substance had taken place, and imperfect villi may be observed in the very centre of the facet-like cicatrix; these circumstances render it probable that a mucous formation takes place from the cicatrix itself. After the healing of the ulcers a shallow depression remains, due to the thinned mucous membrane adhering more intimately to the defective layer beneath; and not unfrequently there is seen in the centre a small portion of the smooth lustrous cicatrix still uncovered by mucous membrane; in other instances the mucous coat is smooth, without folds, less pliable and in comparison with the surrounding tissue less vascular, and in patches less rich in villi. These appearances are sometimes found after a lapse of thirty years. Only in rare cases, in which there has been an extensive loss of substance, does contraction of the cicatrix give rise to a noticeable stenosis. Occasionally the mucous margin around the ulcers becomes hypertrophied and remains permanently raised, contributing nothing to the covering of the cicatrix, while sometimes it has no connection with the subjacent layer and projects into the hollow of the bowel. HARLEY—in *Reynold's System of Medicine*, Vol. I, London, 1866, p. 572 *et seq.*—says that in the earliest stage of typhoid inflammation the patches of Peyer are slightly swollen and a little more vascular than in health. The swelling implicates the network of mucous membrane chiefly, the ridges between the crypts becoming more vascular, wider and prominent, and the intervening depressions more contracted and deeper, while the glands themselves appear unaltered. The inflammatory products are therefore formed around the closed glands without [illegible] Careful observation leads him to speak positively on this point, but [illegible] examination of the illustrations, p. 444 *supra*, suffices to disprove this. He has never seen the glands project on the surface of the patch; they are placed below and between the swollen mucous ridges, and in the later stages are completely buried beneath the inflamed surface. When this covering becomes disintegrated they are discovered lying deeply in the abundant submucous tissue and exhibiting little or no increase of size. The cellular texture is infiltrated with finely granular corpuscles of various sizes, chiefly spherical and averaging $\frac{1}{2500}$ of an inch in diameter. In the more advanced and ulcerated patches the cells are equally numerous, but are large and of more uniform size, averaging $\frac{1}{1250}$ of an inch, and a little more darkly granular. In still more advanced stages the enlarged

Photographed by Dr. E. Curtis U. S. A. *on steel by H. Faber.*

THREE PERPENDICULAR SECTIONS OF ILEUM
showing
enlargement softening and ulceration,
of the solitary glands.
Magnified 12 diameters.

of an infiltrated and impacted patch, with much of the underlying and surrounding submucous tissue, was involved in the necrosis and separated as a slough. Many of the microscopic sections that have been preserved show the vessels of the affected parts filled with blood corpuscles and their periphery surrounded by swarms of the new corpuscular elements, but in none of these sections, nor in those recently cut for examination, were those plugs of micrococci observed which KLEIN invested with the important rôle of causing the death of the tumefied parts.

Enlargement, softening and ulceration, as affecting the solitary glands of the ileum and their site in the mucous and submucous tissues, are illustrated by the plate facing page 444. This is an engraving on steel from photographs of specimens in the microscopic collection. The section on the left of the plate represents specimen 1745, the middle section 1747 and that on the right 1750. These are three of a series of six specimens, 1745–1750, showing various stages of the ulceration of a solitary gland in the ileum from a case the history of which is unknown, but in which the patches of Peyer were thickened at their edges and destroyed in their interior by eroding ulcers, and the solitary glands the subject of what has been called pinhead enlargement and ulceration. The gland in the section on the left of the plate is slightly enlarged and elevated, and embedded in a mass of the new lymphoid cells which appear as a well-defined and darkened setting. In the middle section the outline of the gland has become obscured by the impaction of the surrounding tissue with corpuscular elements, which have also extended through the submucous connective in more or less dense swarms as far as the muscular tunic. In the section on the right the mucous membrane has given way, forming an aperture into a small cavity containing and surrounded by the altered tissues of the mucous and submucous coats.

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capsules contain spherules of oil and there is much intercorpuscular molecular matter. Swelling of the individual glands at this period is due to the enlargement of the corpuscles forming their parenchyma.* HOFFMANN—*Untersuchungen über die Pathologisch-Anatomischen veränderungen der Organe beim Abdominal typhus*, Leipzig, 1869, p. 105 *et seq.*—states that typhoid fever is ushered in by acute catarrhal changes in the intestinal mucous membrane, the capillaries becoming dilated and the circulation retarded, while marked exudation takes place in the mucous tissue. Frequently after death the affected capillaries of the earlier stages of the disease, together with those of the deeper layers of the mucous coat with which they connect, are still found enlarged and filled with blood corpuscles, the red as a rule predominating, although sometimes white corpuscles aggregated in spots are observed in considerable numbers. Towards and within the follicles the vessels diminish in calibre. The thickness of the vascular walls corresponds to their enlargement, so that while the vessels in the immediate vicinity of the follicles show a double contour, in those more distant this condition becomes less distinct and is often wanting. Upon the dilatation of the vessels and the engorgement in connection with it depend in part the morbid appearances in the early stages of the disease; the turgid vascular network around the follicles and other fully-charged vessels throughout the tumefied tissues give to the mucous surface its red color. Resulting from these vascular conditions is a slowness of circulation with a corresponding exudation into the mucous tissues, promoting an abundant shedding of the epithelium. The dilated state of the vessels is often associated with small extravasations, and occasionally, in severe cases, with more extensive ecchymotic blotches; moreover, the pigmentation frequently observed in the later stages points to the fact that such extravasations had occurred. While this enlargement of the capillaries is found very generally in the early period it subsides gradually as tumefaction increases. Although the swelling of the glands is ushered in with an exudation into the mucous tissue, it is dependent upon this only in a slight degree; it is due in great part to the excessive development and increase of the structural elements. In recent cases large cell-structures are seen, some similar in appearance to lymph corpuscles, but twice, three times and even eight times as large, and others poly-nucleated and occasionally notched in one or more places as if in the act of division. This occurring not only in the patches of Peyer and solitary follicles, but also in the adjacent mucous tissue, seems to point to an enormous increase and enlargement of the original lymph-cells; the new cell-structures are the progeny of the old lymph corpuscles and possess nothing specific. The enlarged follicles elevate the membrane covering them and impart to the surface a mammillated aspect; sometimes they project so much as to assume a polypoid appearance, and occasionally by their enlargement in an opposite direction they press upon the muscular coat and give rise to an infiltration of cell elements through its interstices to the serous coat, where they form small grayish bodies beneath the peritoneum. To this infiltration of the cell elements is also due the occasional tuberculated condition of the edges of ulcerated patches. Resolution is ushered in with a diminished afflux of blood. Its simplest form is observed in the upper portion of the bowel and preferably in the least tumefied patches, where it occurs as a rule in connection with others, and may even be so associated with them that one part of a plaque is subject to it and the rest to another, or what is of more common occurrence different portions of the bowel are respectively subject to different forms of retrograde change. In the simpler process great numbers of cells undergo disintegration; among these are included the large structures so abundant in the follicles and contiguous tissue before the diseased process had reached its height. When resorption goes on with uniformity throughout all the structural elements of a patch the tumefaction subsides evenly; but when the contrary obtains inequalities remain on its surface. Absorption, for instance, may go on more energetically within the follicles than in the intervening thickened areolar tissue, which, through the sinking in of the more rapidly diminishing follicles, becomes more prominent and thus gives rise to a reticulated appearance of the surface of the plaque. Sometimes the contents of the glands, including the stroma as well as the altered mass, undergo fatty degeneration, become dissolved and are evacuated; the small cavities which result also give rise to the reticulated appearance just noted. After the evacuation of the follicles numerous minute bloodvessels are seen to pass through their cavities like vessels traversing the hollow of a pulmonary abscess. This condition has an intimate connection with the punctate pigmentation frequently seen in the glands. This coloration is due to little bleedings into the empty follicles from rupture of the minute permeating vessels during the process of disorganization and evacuation; and the extravasations, at first of a red color, become later dark-blue, probably from the action of the intestinal gases. The process of follicular destruction just described constitutes one of the less grave forms of ulcer-formation. Sometimes fatty degeneration commences at superficial points of limited size, where separation from the tissues beneath takes place and a more extensive ulcer is formed, which finds its limit ultimately in neighboring

The plate facing this page shows an extension of the follicular ulcer in all directions by the impaction and subsequent necrosis of the tissues. The interior layer of the muscular coat has been almost reached. Laterally the morbid action has progressed more rapidly in the submucous tissue than in the mucous membrane, so that the latter is left as a thickened edge overhanging the cavity in the former. This is a steel engraving of a photograph of specimen 1756 of the microscopic collection, the section having been derived from the same source as the three that have just been presented.

In the colon the solitary glands usually began to ulcerate before any considerable enlargement or protrusion above the surface of the mucous membrane had taken place. When the corpuscular elements were set free a minute cavity was formed, which became enlarged by progressive ulcerative action in the infiltrated submucous tissue and the caving in of the undermined mucous membrane. This process has already been illustrated by the plates facing pages 568, 570 and 572 of the Second Part of this History.

The changes in the agminated glands were essentially of the same character. The plate facing page 448, *infra*, shows the typhoid thickening of a patch the mucous membrane over which has been in a great measure destroyed, while the glands and submucous connective are converted into a somewhat uniform cellular mass by the dense aggregation of the corpuscles. This plate was engraved from a photograph of specimen 1704, one of a series of thirty-two perpendicular sections of the ileum of a dark mulatto woman who died in the Freedman's hospital, Washington, D. C.

This patient, twenty-six years of age and nursing an infant three months old, was admitted Sept. 5, 1865, with typhoid fever. She had been suffering for four weeks from fever, headache, anorexia, thirst and pain in the abdomen; pulse feeble and rapid, 120; skin hot and dry and tongue coated with a thick yellow fur; the bowels were moved once daily, the passages being of a greenish color, but diarrhœa set in prior to death on the 13th. At the

mucous structures supplied with normally abundant bloodvessels and organically unaltered. Such ulcers have moderately elevated edges and are often of considerable extent; occasionally they penetrate the muscular tunic and lead to perforation.[9] When in process of healing, there spring up on the floor of the ulcerated cavities fine granulations which become covered with a transparent and sometimes pigmented membrane. The more frequent and dangerous process of ulcer-formation proceeds with greater energy: The tissues which by cell-multiplication and enlargement have been deprived of their nutrition separate in defined patches by sloughing. After the detachment of the slough the surface is in many cases moderately red with strongly injected edges; in others dark-red and often ecchymosed from the presence of a capillary network on the surface of an extremely delicate granulating tissue in which a lesion readily leads to hemorrhage. These sloughing ulcers sometimes extend to the submucous, muscular and even to the serous coat of the bowel. Sometimes the two modes of ulcer-formation occur in the same plaque, the milder attacking the margin of sloughing ulcers and forming confluent sores of large size. Sometimes, too, the destructive and reparative processes are present in the same ulcer, the former going on in the centre and the latter at the circumference. While this is generally difficult to demonstrate, instances have been observed in which the marginal structure bears so decidedly the characters of new tissue that there can hardly be any doubt of attempts at repair. The tissues which border the ulcers towards the exterior aspect of the bowel have generally their natural firmness increased by the effusion of plastic elements, but occasionally these structures become brittle or gangrenous and either lead to perforation or predispose to peritoneal inflammation. Typhoid cicatrices present themselves in the form of smooth formations, red at first but later deeply pigmented, a peculiarity occasionally observed even after the lapse of years. No villi are found on these cicatrices, and even the mucous tissue itself fails to be developed from the granulating material when the ulceration had penetrated to the muscular coat. Gangrene as a rule makes its appearance in spots of limited size in parts that have been excessively infiltrated. In some cases of extensive ulceration diphtheritic inflammation complicates the typhoid process and affects both the small and large intestine to a variable extent. This is seldom confined to one locality, but fixes at the same time upon several portions of the digestive tube; frequently it starts from the larger ulcers and is a cause of recurring hemorrhages; sometimes no relation to existing ulcers can be determined, and in these instances secondary ulcerations, resulting from the diphtheritic inflammation, often appear at a late period. According to Rindfleisch—*Pathological Histology, New Sydenham Society*, London, 1872, Vol. I, p. 438 *et seq.*—the closed glands of the small and large intestine participate in a catarrhal inflammation of the mucous membrane. The solitary glands appear as dull-gray pearly nodules the size of a pinhead, surrounded by a hyperæmic plexus of vessels; and each of the individual glands of the patches of Peyer become similarly affected. After this the glands pass into the stage of medullary infiltration in which the solitary follicles attain a size even six times greater than the normal, and the perifollicular connective becomes infiltrated. The aggregated follicles of a patch coalesce with the interstitial tissue to form a soft, rose-colored, seemingly homogeneous mass resembling the medullary substance of the fœtal brain, the entire patch appearing as a flattened elevation two lines in height, of an elongated oval outline and marked off from the surrounding mucous membrane by a precipitous edge. The infiltration is composed of a numerical increase of the corpuscular elements and an increase in the size of these individually. They contain a larger proportionate quantity of protoplasm than the simple lymph corpuscle; the protoplasm of the latter scarcely equals the contained nucleus in amount, but in the typhous cell it usually takes up more space than the nucleus. The morbid product is removed by a process of colliquative softening, the cells becoming disintegrated into oily matters which are absorbed; or failing this the deposit passes into a state of cheesy necrosis and is removed by ulcerative action. Klein—in his *Report on the Intimate Anatomical Changes in Enteric or Typhoid Fever*, in the Report of the Local Government Board, London, 1875, pp. 80–124—describes the changes in the intestinal mucous membrane as beginning with a distention of the vessels surrounding the lymphatic follicles. This is followed by swelling of the solitary glands due to an accumulation of ordinary nucleated lymph corpuscles. Similar accumulations in the mucosa exercise a destructive compression on the crypts of Lieberkühn, detaching their epithelium and converting it into masses of cells, which by the occasional occlusion of the follicular aperture appear sometimes to be contained in a closed cyst. The lymphoid corpuscles are also increased in the submucosa, particularly in and around the bases of the solitary and agminated glands. But this observer objected to consider all the minute prominences on the mucous membrane to be enlarged glands, as he had been able to trace back their development to small accumulations of the lymph corpuscles in the mucosa, and moreover, the solitary glands are not so numerous in man as are frequently the minute tumefactions found in typhoid fever. Following

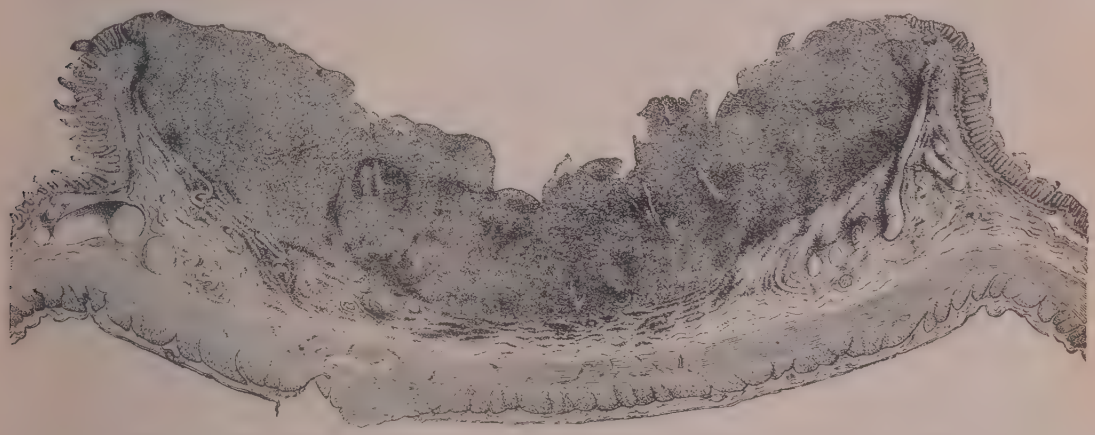
FOLLICULAR ULCER

which has penetrated nearly to the muscular coa

Magnified 12 diameters

post-mortem examination sixteen hours after death great emaciation and marked rigor mortis were noted. The lower lobes of the lungs were somewhat congested. The duodenum and ileum were inflamed throughout, the jejunum in patches. The agminated glands were enlarged and thickened gradually from above downwards; each of those in the lower third of the ileum presented one or more points of ulceration; some near the valve were completely ulcerated away, leaving the fibres of the muscular coat exposed, while on the valve and for about four inches above it the whole mucous surface was a mass of enlarged and thickened patches, each presenting several points of ulceration. The ascending colon was inflamed and deeply ulcerated in transverse oval patches, some of them two inches in diameter and with overhanging edges,—there were also a few enlarged solitary follicles the size of peas, some of which were ulcerated on the apex; the transverse colon presented a few small round ulcers which had penetrated to the muscular coat; the descending colon was inflamed in patches and had in the sigmoid flexure a group of small oval ulcers and slightly enlarged solitary follicles with specks of pigment in each; the rectum also presented a few small ulcers.—*Hospital Steward A. J. Shafhirt, U. S. Army, Freedman's Hospital, Washington, D. C.*

The photo-engraving which follows this paragraph illustrates the appearance of a perpendicular section of a patch when its superficial layers have been removed by necrobiotic processes. The section shows a shallow ulcer with abrupt edges, involving the whole patch. The glandular stroma and intervening submucous tissue are indistinguishable on account of the great accumulation of the corpuscular elements. The tissues around the impacted portions are freely beset with swarms of new cells and liberally supplied with vessels which are generally filled with blood corpuscles.



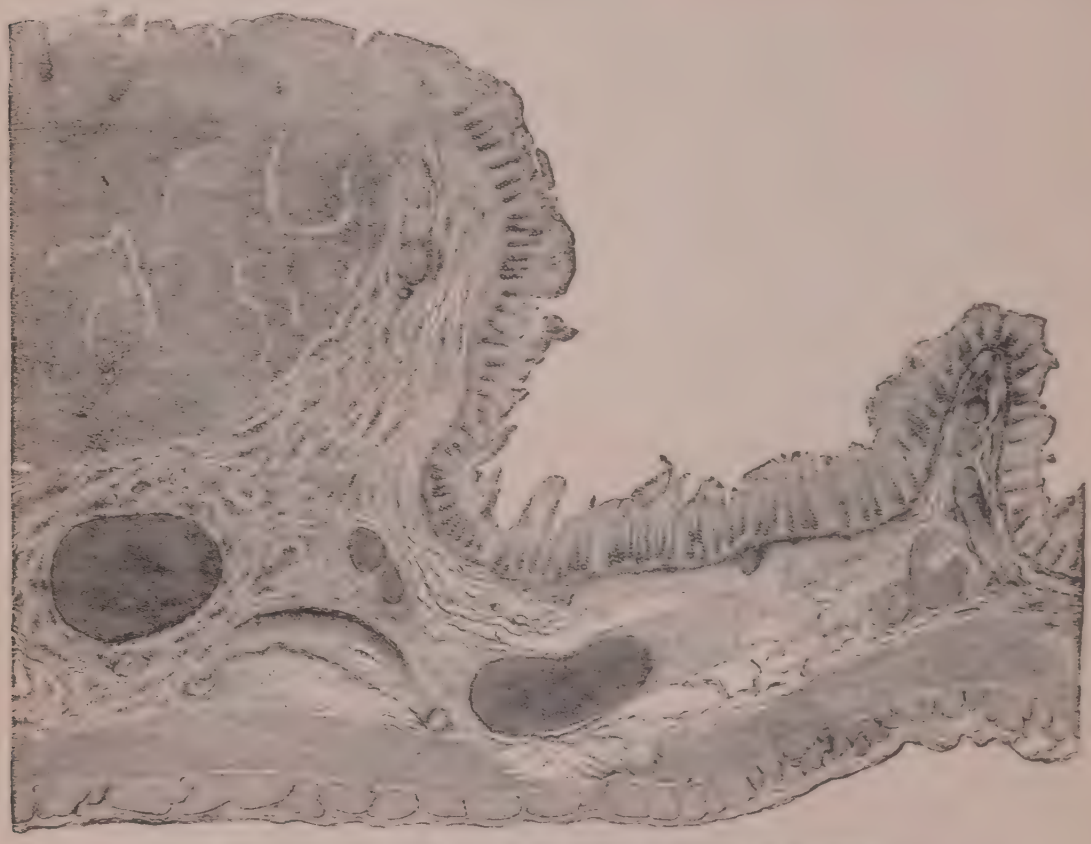
Section of a typhoid patch: Specimen 7489, microscopic collection, Army Medical Museum, magnified 13 diameters and subsequently reduced one-third.

The record of the case from which this specimen was obtained reads as follows:

Private George Hayes, Co. B, 12th U. S. Inf.; age 25; was admitted from Russell Barracks, Washington, D. C., Aug. 25, 1866, with typhoid fever. [He had been confined to the guard-house at the barracks from May 10. About August 1 he complained of diarrhœa and was excused from fatigue duty. Afterwards, symptoms of typhoid fever having appeared, he was sent to the post hospital.] On admission he was quite stupid, but could readily be aroused. On the afternoon of the 26th he became delirious and during the night required constant watching and restraint to keep him in bed. This continued until the forenoon of the 27th, when almost complete loss of sensibility ensued. He could not swallow; an attempt was made to give him a spoonful of beef-tea, but it nearly strangled him. Heavy stupor continued until about noon of the 28th, when death took place. *Post-mortem* examination five hours after death: There was an opacity of the arachnoid at the base of the brain, with some effusion of lymph just below the medulla oblongata on the posterior portion of the spinal cord. Peyer's patches were much thickened and ulcerated, especially in the lower part of the ileum; the villi were hypertrophied and the solitary follicles enlarged to the size of peas, many of them ulcerated at their apices. The solitary follicles of the large intestine were similarly affected.

this enlargement there appear in the swollen tissues some cells two to four times as large as the lymphoid corpuscles, but with a larger nucleus than the latter; and sometimes this nucleus is apparently undergoing division. As intermediate forms are observed between these large cells and the lymphatic corpuscles it seems that the whole of the corpuscular mass originates in the lymphoid elements. Gradually the ordinary lymphatic corpuscles become enlarged or the enlarged cells incorporate the smaller ones, until the adenoid tissue contains only cells of the larger size, each enclosing an ovoid, transparent nucleus situated peripherally, and a variable number of spherical nuclei either isolated or in groups embedded in the substance of the cell or enclosed in a vacuole. In the centre of the tumefied gland many of the cells assume the characters of true giant-cells, each containing from ten to thirty nuclei; but the giant-cells of typhoid tumefaction differ from those of tubercle in that their stroma is provided with bloodvessels. A change was also observed to take place in some of the arterial capillaries of the impacted follicles; they became more or less obstructed by a deposit of yellowish colloid substance between the lining endothelium and an adventitial thin nucleated membrane; their walls were thickened and their lumina distorted. In addition to these appearances in the stage of tumefaction, KLEIN observed in the crypts of Lieberkühn some highly refractive greenish-

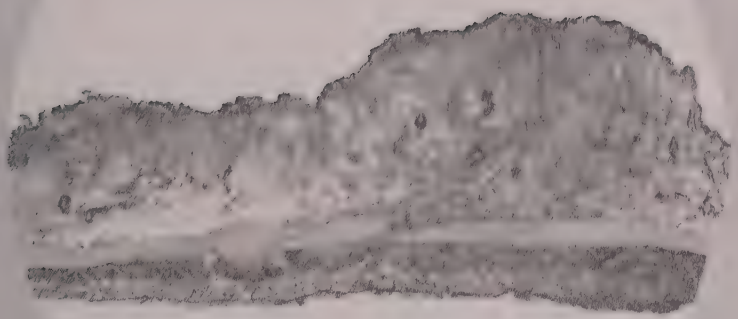
A section of a patch, constituting No. 7479 of the microscopic collection, from the case just reported, is represented below. The lymphoid elements are densely packed in the glands and adjoining stroma, and freely distributed in the mucous and submucous layers of the surrounding parts of the intestine. the vessels in the submucous tissue are distended with coagulated blood.



Section of a typhoid patch: Specimen 7479, microscopical collection, Army Medical Museum.

The illustrations submitted above show the affection of the interlying tissue of the submucosa to be as strongly marked as that of the glands themselves, so that had necrosis taken place it would have affected the patch as a whole, the surface continuing to break down and be carried away with the intestinal contents until the disintegrated mass was completely removed. But it is evident from the reticulated appearance of many ulcerated typhoid patches that certain parts were more susceptible to the morbid process than others. The parts specially liable to impaction and consequent necrosis were the follicular components of the patches. This is illustrated by the following photo-engraving of a specimen.

yellow corpuscles, varying from the size of a mere granular point to that of a human red-blood corpuscle. They were mostly spherical, hour-glass or kidney-shaped, and seemed to be held together by a transparent connecting substance; some of them, particularly the terminal cells, contained minute bodies resembling spores or micrococci. He regarded these as joints of the mycelial threads of an organism similar to the Crenothrix polyspora, described by Cohn in 1870 as characteristic of the vegetation discovered by him in the well-water of a district of Breslau noted for the prevalence of enteric fever. Klein found the micrococci as zoogloea masses in the lymph-spaces adjoining the tubular follicles, and also impacting the veins and venous capillaries of the affected solitary and agminated glands and of the adjacent mucous and submucous tissues; he found them also in the alvine discharges. When the tumefaction reached its height the corpuscular elements appeared to fade, break down and become absorbed or detached as a slough, while the stroma was converted into a dense felt-work of stiff highly refractive fibres. He did not consider this due wholly to compression of the bloodvessels by the surrounding accumulation of new elements and the encroachments on their lamina by the colloid deposit; on the contrary, as he had observed a fading of the corpuscular elements and other signs of a retrograde change specially marked in the neighborhood of vessels impacted with micrococci, he regarded these organisms as the chief cause of the necrotic developments.



Photographed by W. P. Gale. U.S.A. on Wet Plate Collodion

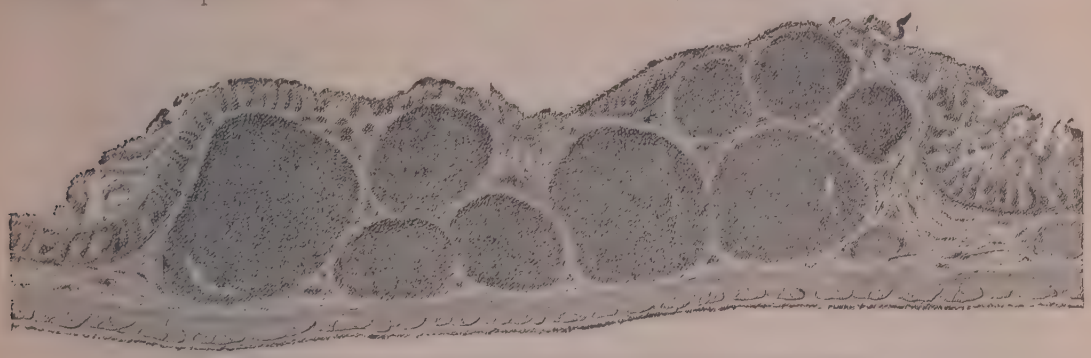
PERPENDICULAR SECTION OF ILEUM

Showing

Lymphoid Tissue of a Peyer's Patch,

Magnified 15 diameters.

7454 of the microscopical series, contributed by Dr. W. W. JOHNSTON, of Washington, D. C. The cellular elements, while freely scattered throughout the mucous layer and the adenoid tissue of the submucosa, are so densely aggregated in the glands that each is converted into a distinct and separate cellular tumor.

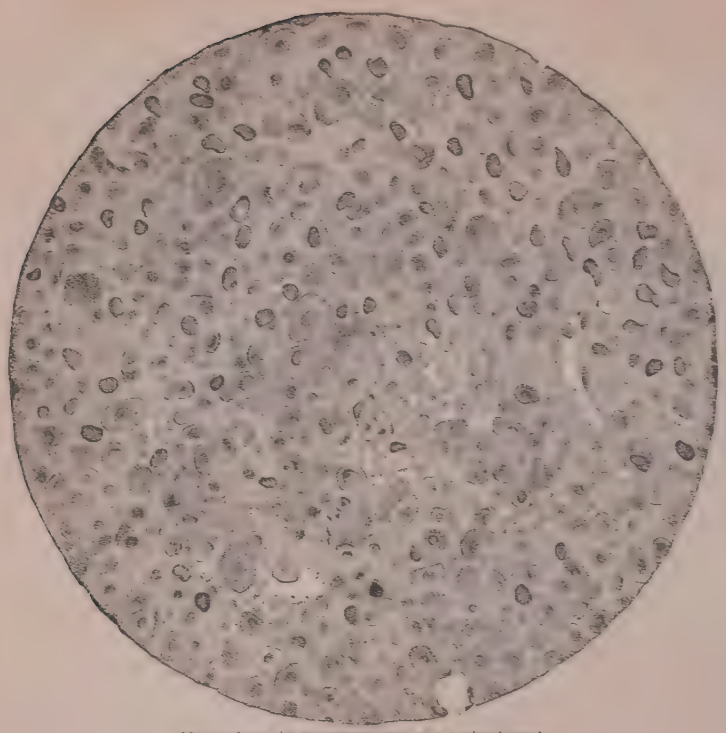


Section of a typhoid patch : Specimen 7454, microscopical collection, Army Medical Museum.

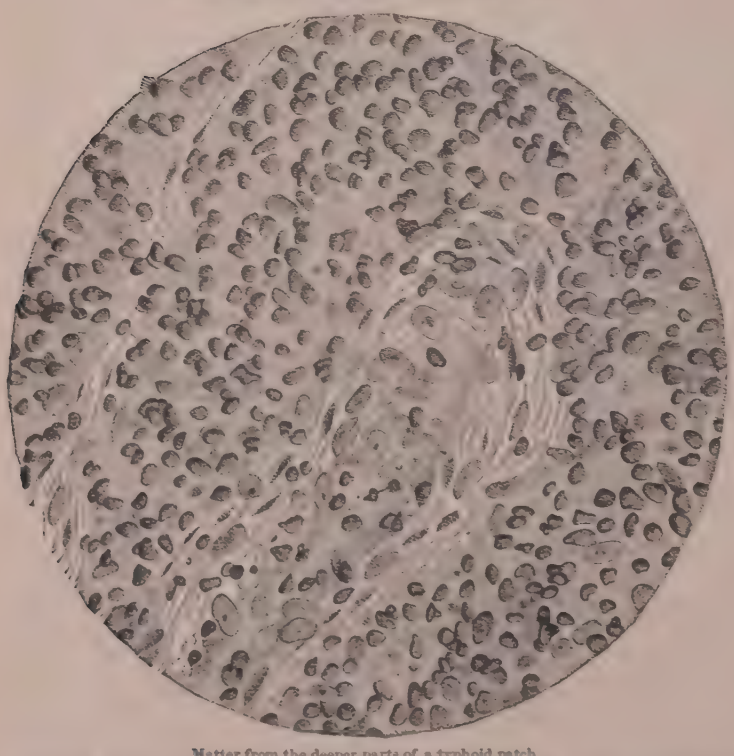
The case from which this specimen was obtained was that of a child three years of age, who had suffered for almost a week with slight fever and diarrhœa. He died apparently of syncope about an hour after swallowing, through the carelessness of attendants, eighteen sugar-coated pills each said to contain three grains of quinine. *Post-mortem* examination found the heart relaxed, the right cavities empty, the left containing fluid blood. The lungs were congested posteriorly. The liver and pancreas were normal; the Malpighian bodies of the spleen were well marked. The stomach was congested and ecchymosed; the duodenum and jejunum congested, their glands conspicuous and villi hypertrophied. In the ileum also the villi were hypertrophied; the solitary and agminated glands were progressively enlarged, and the serous surface corresponding to the bases of the latter was patched with arborescent congestion; the contents of the intestinal glands were dark and granular. The mucous membrane of the large intestine was congested and its follicles enlarged. The examination was made by Dr. D. S. LAMB, of the Army Medical Museum, Surgeon General's Office.

The plate facing page 450 further illustrates the special liability of the glands, as distinguished from that of the surrounding adenoid tissue, to impaction and disintegration. It is etched on steel from a photograph of specimen 455 of the microscopic collection, one of a series of nine perpendicular sections of the ileum, showing the ulcers to have originated in the individual glands of the patch. These sections are from the case submitted as 323 of the *post-mortem* records of the continued fevers. They show admirably the softening and discharge of the glands each by its own aperture, the gradual enlargement of the resulting cavities and the coalescence of these, embracing the whole of the patch in the irregularly ulcerated area.

To illustrate the minute anatomy of the corpuscular elements the two figures on the following page have been introduced. The lower represents the deeper portion of a section of an enlarged agminated gland, from the case which furnished the specimen delineated in the figure on this page; the upper is a view of a more superficial portion of the same section. These were drawn under a magnifying power of 700 diameters by Dr. J. C. MCCONNELL of this office, and afterwards reduced by the photo-electrotype process to two-thirds the size of the original drawing. In the deeper portion the endothelial cells are principally confined to the vessels; the intervascular spaces are occupied by a variety of lymph corpuscles, some of which, by their aggregation, suggest a multiplication by fission, while others are possibly passing into the round, mononucleated vesicular form which is the prevailing type in the superficial parts of the affected patches. Instances suggesting the transition of the ordinary lymphoid corpuscle into the nucleated cell may be observed on the field. This transition seems the more probable, as nearer the surface or in more advanced stages the true lymphoid cells are found to have been to a great extent replaced by the



Matter from the superficial part of a typhoid patch.



Matter from the deeper parts of a typhoid patch.

larger nucleated and granular cellular bodies. These appear to become larger, hazier in outline and ultimately to disintegrate into a molecular or granular mass.

Erosion of the intestinal mucous membrane.—In case 23 of the *post-mortem* records it is stated that the ulceration of the mucous membrane was unconnected with the state of the solitary glands. It seems that the aggregation of the corpuscular elements in the mucous membrane, aside from the situation of the closed glands, sometimes gave rise to an erosion of the membrane. The destruction of the epithelium left the underlying infiltrated tissues with an abraded surface, which became extended and deepened by the removal of the softening and disintegrating corpuscles. When such ulcers were small and shallow their mode of origin could usually be determined; but when large and deep it was often impossible to discriminate between them and those that followed the separation of a diphtheritic slough or the necrosis of a follicle and its surrounding tissue.

Hemorrhage, perforation and peritoneal inflammation.—The necrobiotic processes occurring in the diseased agminated glands, or in patches usually involving one or more of the solitary glands, were attended in their progress by an increasing liability to hemorrhage from the intestinal

Photographed by Dr Curtis

The softened contents

vessels and to an extension of the inflammatory action to the serous lining of the abdominal cavity. Manifestly these dangers were proportioned to the rapidity of the processes, for although the records are not sufficiently explicit to give a numerical expression to this proportion, the disorganized condition of the intestine, in many cases characterized by clinical or *post-mortem* evidence of hemorrhage or peritonitis, indicates that a sloughing of the diseased patches rather than a progressive ulceration was under observation.

In some cases, particularly such as were due wholly or chiefly to the malarial influence, the occurrence of hemorrhage may be ascribed to that extreme congestion of the parts which led to the extravasation of blood even into the submucous tissues. In cases also that were purely typhoid it is probable that the slight hemorrhages which were observed in the early period of the disease were due to congestion.* But when bleeding took place later, and especially when it was profuse, it could with propriety be ascribed to no other cause than a break in the walls of the vessels by the separating tissues of the small intestine in typhoid cases and of the large or small intestine in those due to malaria or complicated by dysenteric processes. Hemorrhage from the bowels was probably the cause of death in the cases 21, 27, 110, 176, 323, 325 and 335.

Peritoneal inflammation in continued febrile cases was sometimes due to other causes than the extension of the intestinal ulcerations. The condition of the mesenteric glands was in some instances the determining cause; this, however, may be regarded as an indirect extension from the ulcerated mucous membrane. The degeneration of the abdominal recti muscles in cases 63 and 151 probably gave rise to the peritonitis from which the patients suffered, while in 249 it resulted from the rupture of a degenerated spleen. When due, as was usually the case, to an extension of the morbid action from the ulcerated intestines, the peritoneal inflammation was generally associated with perforation of the intestinal wall. Nevertheless, a number of cases have been instanced in the analytical summary in which peritonitis was present, although none of the ulcers had perforated; and several specimens preserved in the museum show plastic exudation on the peritoneal surface in cases which had no record of perforating ulcers. But while in some cases a local peritonitis may have preceded the perforation with which general peritonitis was usually found associated after death, the sudden advent of acute pain, tenderness, vomiting, hiccough and extreme prostration indicates that the serous coat seldom became largely involved until the occurrence of perforation and extravasation of the intestinal contents. On the other hand, perforation sometimes occurred without giving rise to the symptoms or *post-mortem* appearances of peritoneal inflammation. Either the perforation was effected while the patient was in his dying agony, so that there was no time for the development of the morbid appearances that generally attend extravasation of the intestinal contents, as may have been the case in 32, or the adhesion of contiguous serous surfaces strengthened the point of impending rupture and limited the area of inflammation by preventing communication with the peritoneal cavity, as appears to have been the case in 385.

From what has been said of the circumscribed character of the diseased processes in typhoid, as compared with the extent and diffusion of the hyperæmia in the cases attributed to malaria, it is not surprising that perforation should have proved so frequent a result in the former and so rare in the latter. Case 367 is the only example of perforation in which typhoid ulceration of the patches of Peyer was not discovered at the *post-mortem* exam-

*See *supra*, p. 294.

ination. Forty-three cases of perforation have been submitted to analysis, and as these occurred in three hundred and eighty-nine cases of continued fever, perforation took place in 11 per cent. of the cases. But if the sixty-three malarial cases which furnished but one instance of perforated bowel be withdrawn from the calculation the frequency of this accident in probably typhoid cases will be increased to 12.9 per cent. MURCHISON, as the result of a tabulation of 1,721 cases recorded by various observers, found that perforation occurred in 196 or in 11.38 per cent.* In twenty of the forty-three cases the site of the perforation was reported to have been the patches of Peyer: in eighteen the ileum; in two the small intestine; in one the intestine; in one the cæcum, and in one the sigmoid flexure of the colon. It is evident from these figures that ulceration of the agminated glands was generally, and of the solitary glands rarely, the cause of the perforation, notwithstanding the frequency with which the latter were affected by the morbid processes. Had perforation at the site of the solitary glands been a common occurrence it would have been reported in the large intestine with greater frequency than twice, cases 33 and 300, in forty-three cases.

As the sloughing or ulcerative action progressed at so many points in the same intestine it not unfrequently happened that more than one break was found at the *post-mortem* examination. Thus, in the series of pure typhoid cases there were two perforations in 16, three in 32, five in 19 and several in 17, 18 and 50. Furthermore, on account of the irregularity of the advance of the destructive process in the same area of ulceration it sometimes happened that more than one break was found on its floor, as may be seen in one of the ulcers represented in the plate facing page 382. The specimen, 370, Army Medical Museum, from which this was photographed was taken from the patient whose case appears as 159 of the *post-mortem* series already submitted. The clinical record says that this soldier had well-marked symptoms of typhoid fever; he was delirious and extremely prostrated, and there was much distention and tenderness of the abdomen, but no diarrhœa until a few days before death. Five of the ulcers in the ileum had perforated. Five specimens, 369–373, Army Medical Museum, from this case have been preserved. The first, taken from high up in the ileum, presents five irregular ulcerations from one-quarter to half an inch in diameter, penetrating nearly through the muscular coat. The second, represented in the plate to which attention has been invited, shows three irregular oval ulcers, each about an inch in diameter, their edges thickened, their bases formed by the muscular coat except where perforation has been effected; the perforation in the upper ulcer is small, but a little to the left is a point at which a break through the serous coat was about to take place; the middle ulcer presents an oval perforation nearly half an inch long, having shreds of the peritoneal coat attached to its margin, while immediately above the perforation is a point where the serous coat has been exposed; the lower ulcer presents in its centre an oval patch one inch in its long diameter, in the upper part of which the serous coat retains its position, forming the floor of the cavity, while in its lower portion this coat has given way, forming four oval apertures separated from each other by shreds of the serous membrane; the solitary follicles are slightly prominent, and there is pseudomembranous exudation on the peritoneal surface of the specimen. The third and fourth specimens, 371 and 372, present ulcers similar to those represented in the plate, one of which in each instance has perforated the intestinal wall; some

* His table shows that this undesirable result was of more frequent occurrence in the experience of English observers than in that of Continental physicians. Thus, of 412 fatal cases recorded by himself, BRISTOWE, JENNER and WATERS, perforation was found in 80 cases or 19.41 per cent.; of 270 cases by the French observers, LOUIS, BRETONNEAU, CHOMEL, MONTAULT and FORGET, perforation was discovered in 25 or 9.25 per cent., and of 1,039 cases by the German observers, GRIESINGER, HOFFMANN, LEBERT and others, 91 or 8.75 per cent. had the intestine perforated. See his treatise, p. 566.

minute punched-out ulcerations, corresponding to the solitary glands, are also seen in these sections. The last specimen, 873, taken from just above the valve, has the mucous membrane considerably thickened and studded with enlarged solitary follicles; there are also several irregular ulcerations, one of which measures fully two inches in its long diameter, the floors formed by the muscular coat of the intestine. These specimens may be accepted as illustrations of the fact that the part of the ileum usually perforated in typhoid fever has more frequently some distance above the valve than immediately adjacent to it.

Perforation of the site of the agminated glands is also illustrated by the plate facing page 343. The specimen, 452, Army Medical Museum, from which this was photographed was obtained from the patient whose case is recorded as 43 of the *post-mortem* records of the continued fevers. In this instance the perforated part of the ileum was but few above the ileo-cæcal valve. The aperture, small and oval, appears near the centre of a large irregularly shaped ulcer with overhanging edges and a smooth and even floor formed by the muscular coat; its margins are as sharply defined as if the part had been punched out. The specimen shows also some small ulcers of the solitary glands situated between the transverse mucous folds and extending through the submucous tissue to the muscular tunic, while on its peritoneal surface is a coating of pseudomembranous lymph.

The inflammatory condition of the ileum in a case of death from peritonitis consequent on perforation is well shown on the chromo-lithograph facing page 391. The specimen, 147, Army Medical Museum, from which this drawing was made was taken from the case recorded above as 224 of the *post-mortem* records. The peritoneal cavity contained a large quantity of pus and serum. The serous membrane was generally thickened and congested; over the intestine in some parts it was of a brilliant red color, in other parts deep red or almost black. The ileum for five feet above the cæcum was more or less ulcerated, and at a point about eighteen inches above the valve it was perforated. The drawing on the right of the plate shows the mucous surface at the locality of the perforation. The perforation, large and oval, occupies nearly the whole of the site of the original ulceration, and the mucous membrane, of a livid-brown color, lies in closely set transverse folds and shows several ulcerated patches above and below the perforated point. The drawing on the left of the plate represents the serous surface of the same specimen: The intensely injected peritoneum is coated in yellowish patches with pseudomembranous lymph.

Reparation of the intestinal ulcerations.—But when, instead of extension and penetration through the walls of the intestine, a reparative process was initiated after the removal of the necrosed and disorganized tissues, the vessels adjacent to the lesions became enlarged and the ulcerated cavities filled with granulations over which the mucous membrane advanced from the edges to the centre as a thin and glistening covering. The area of the cicatrized surface was much less than that of the original ulceration, as the mucous membrane became drawn over it by the subsequent contraction of the connective tissue of the granulations. In the solitary glands the ulcers appeared as a smooth rounded spot around which the mucous membrane between the tubular follicles was drawn into radiating ridges, giving the whole a stellate appearance, which has been illustrated by the photograph of specimen 903, Army Medical Museum, facing page 128 of the Second Part of this work. The contraction of destroyed patches of Peyer was manifested by puckering of the mucous membrane and occasionally by the depression of the mucous folds in the neighborhood of each to radiate from it. Ulcerations left in the intestines after the healing of ulcerated

patches have been illustrated by five plates,—one a chromo-lithograph of a recent specimen, and the others photographic reproductions of preserved specimens.

Nothing is known of the history of the case represented by the chromo-lithograph. The plate facing this page shows the lower portion of the ileum and part of the cæcum. On the mucous surface of the former are a number of oval ulcers similar to those frequently left after typhoid fever; the cream-colored membrane is injected in reddish patches; the colon, also somewhat injected, shows several follicular ulcers.

The photographic reproduction of specimen 597, Army Medical Museum, facing page 456, shows a portion of the ileum with the ileo-cæcal valve and part of the cæcum. A Peyerian patch, one and a half inches above the valve, presents an oval cicatrix which is somewhat obscured by the pseudomembrane covering the whole of the mucous surface; there are some small ulcerations near the valve. This specimen was taken from a soldier who died of dysentery, apparently subsequent to his recovery from an attack of typhoid fever.

Private William Henry, Co. G, 8th N. Y. Cav.; age 18; was admitted July 22, 1865, with chronic diarrhœa. [This man appears on the records of the Augur hospital, near Alexandria, Va., as admitted from regimental hospital June 24 with acute rheumatism, and sent to Slough hospital July 22.] He died on the 29th. *Post-mortem* examination: Body not much emaciated. The lungs were collapsed, of a gray color and without pleuritic adhesions. The heart was normal. Externally the liver was clay-colored; internally it presented the nutmeg appearance. The spleen was lake-red on section. The sigmoid flexure was folded down against the anterior wall of the pelvis, to which it adhered by a layer of yellow semi-transparent lymph. Portions of the ileum were also adherent, the adhesions enclosing a little yellow serum in the lower part of the pelvic cavity; the peritoneal surface of the last foot of the ileum was much injected and its mucous membrane coated with whitish pseudomembrane; Peyer's patches were tumid and reticulated. The large intestine was thickened and its mucous lining, which was dirty and blackish, presented a number of shallow irregular ulcers and patches of pseudomembrane.—*Act. Ass't Surg. W. C. Minor, Slough Hospital, Alexandria, Va.*

Specimen 459, Army Medical Museum, which is represented in the plate facing page 404, is from the case reported as 300 of the *post-mortem* records of the continued fevers. The large intestine was said to have been thickened and ulcerated, and in the sigmoid flexure perforated, while the mucous lining of the ileum was eroded and the agminated and solitary glands ulcerated. The portion of the ileum represented was taken from just above the ileo-cæcal valve. It shows cicatrices in four of the patches of Peyer,—in the upper two the process has been completed; in the lower two the ulcers are not wholly cicatrized. The solitary glands are enlarged and prominent. Sections of the follicles from this specimen have been presented in the plates facing pages 326 and 328 of the Second Part of this History as illustrative of the follicular changes in acute diarrhœa.

The plate facing page 401 represents a portion of the ileum from the tract of the valvulæ conniventes, taken from the patient whose case is reported as 298 of the *post-mortem* records of the continued fevers. The record states that the mucous membrane of the ileum was of a grayish-slate color, its villi hypertrophied and dotted at their apices with black pigment, and that the patches of Peyer were in every stage of cicatrization, the ulcers smooth and the gut around them puckered. On the specimen represented hypertrophied villi are seen on all parts except the cicatrices, which are marked by their smoothness and the breaks in the transverse folds of the mucous membrane. Three sections of a cicatrized patch from this ileum, constituting specimens 470–472 of the microscopic collection, show it to consist of condensed connective tissue, embedded in which are a few of the original glands of the locality.

The contraction of the cicatrix is so strongly marked in the plate facing page 458 that the interrupted and adjacent valvulæ tend to radiate from the newly-formed tissue;

some small tubercles are situated on the peritoneal surface. The specimen, 887, Army Medical Museum, which furnished this illustration has, unfortunately, no recorded history.

PIGMENTATION OF THE INTESTINAL LINING.—There remain for consideration the pigmentary deposits sometimes observed in the intestinal walls. This pigment was seen only on the fresh intestine; it disappeared under the treatment adopted for the preservation of the specimen. Usually it occurred in streaks or patches of a gray, greenish, bluish or other dark color, affecting the general surface of the mucous membrane of the small or large intestine. Sometimes it was aggregated in the apices of the hypertrophied villi of the small intestine, giving a dark tinge to its plush-like surface. Large accumulations were found in the solitary follicles and in the glands of the patches of Peyer, constituting what was known as the *shaven-beard* appearance in the affected area of the latter.

The diffused streaks of pigment on the general surface of the mucous membrane consisted of minute brown granules deposited in the lymphoid cells of the stroma between the follicles of Lieberkühn, and most abundant about midway between the epithelial layer and the muscle of Brücke. The deposits in the solitary and aggregated glands consisted of similar granules in the cells of their parenchyma. But in all these instances the pigment was occasionally observed in larger agglomerations, situated apparently between the corpuscular elements rather than within them.

Dark colorations of the mucous membrane had long been recognized as due to antecedent hyperæmic conditions. LOUIS regarded them as vestiges of an extinct enteritis, and assigned a similar origin and meaning to the dark color of the mesenteric glands after typhoid. But the shaven-beard patches were wholly misunderstood by our medical officers during and after the war. They were regarded as pathognomonic of the malarial form of typho-malarial fever. Indeed a chromo-lithograph, reproduced in the present volume, and facing page 460, was published in Circular No. 6, Surgeon General's Office, Washington, D. C., Nov. 1, 1865, as an illustration of the characteristic lesion of this form of fever.* The plate represents the congested condition of the membrane, the injection of the vessels, the enlargement of the solitary follicles and the shaven-beard appearance of the patches of Peyer. The case from which this specimen was taken is reported as 89 of the *post-mortem* records of the continued fevers.

No further light was thrown upon this pigmentation of the closed glands of the intestine until, in his remarks on typho-malarial fever, read before the Section of Medicine of the International Medical Congress, Philadelphia, 1876. Dr. WOODWARD gave an outline of what he considered to be the clinical course of the malarial form of typho-malarial fever, to which was added an acknowledgment that *post-mortem* examination of the diseased intestines in these cases showed no other lesion than those which were the invariable accompaniment

* "The most characteristic specimens may be thus described: In the fresh intestine as received at the Museum the ileum presents patches of deep congestion of variable extent; the solitary follicles, enlarged to the size of large pinheads, are frequently black with pigment deposits. The Peyer's patches sometimes quite healthy are more generally the seat of pigment deposits in the individual follicles composing the patch, which appears of a gray color dotted over with blackish points, presenting a resemblance to the freshly-shaven chin. The name "shaven-beard appearance" has been quite currently bestowed upon this condition. In other cases the Peyer's patches are somewhat thickened and occasionally as much so as in ordinary cases of enteric fever. In the preparations as preserved in the Museum the color of the pieces, including that of the pigment deposit, gradually disappears. The enlarged solitary follicles and the alterations in the Peyer's patches are, however, well preserved. The solitary follicles are not ulcerated in these cases except rarely some of the largest, which may present a minute point of ulceration on the apex. The form of fever from which these specimens are obtained is that which attracted attention in 1862, under the designation of Chickahominy fever, but which before and since has prevailed whenever our armies have operated in malarial regions. It is a continued fever which presents also a more or less decidedly remittent type at the beginning at least. It is accompanied by diarrhœa and abdominal tenderness, but usually without tympanites. Cerebral and pulmonary complications are common as in ordinary enteric fever. Enlargement of the spleen is frequent and often excessive. The fever usually lasts from three to five weeks and terminates in a lingering and protracted convalescence. This variety I have proposed to designate as the Malarial form of Typho-malarial Fever."—Dr. WOODWARD in Circular No. 6, p. 11o.

of a smart intestinal catarrh, to wit: Patches of congestion, enlargement, with sometimes ulceration and pigmentation of the solitary follicles, and frequently a slight tumefaction of the patches of Peyer with such pigmentary deposits as gave them the shaven-beard appearance.*

The next reference to the meaning of these accumulations is contained in the Second Part of this work,† published in 1879. At this stage of his investigation Dr. WOODWARD showed officially the connection of the pigment with those hyperæmic conditions of the membrane that are manifested clinically by continued diarrhœal attacks. In view of the testimony then presented there appears no ground for doubting the origin of the deposits in minute extravasations into the mucous membrane or in the plugging of its capillary loops. They were of more common occurrence in the patches of Peyer than in the solitary follicles, notwithstanding the frequent and decided enlargement of the latter. The former, although seldom much swollen, were often more distinct than normal from participation in the general hyperæmia of the mucous and submucous tissues. Occasionally, indeed, a diarrhœal case presented such morbid changes, including ulceration of the agminated glands, as were suggestive of the presence of typhoid fever: In the plate facing page 300 is a thickened patch which appears as a dark elliptical spot two inches long by an inch in its transverse measurement, its surface not materially elevated above that of the surrounding membrane, but thicker than normal, and by transmitted light more opaque than any of the other patches observed in this subject. In the plate facing page 302 is a plaque which shows a greater advance towards a morbid condition; its surface, which is not materially raised above the surrounding level, is marked by narrow broken lines studded with hypertrophied villi similar to those on the general surface of the specimen, and between these are irregular areas which, being destitute of villi, seem depressed below the adjacent level and give the patch a somewhat reticulated appearance; in its centre is a shallow oval ulcer an eighth of an inch in diameter; half an inch below this, near the right margin, is a similar ulcer, and a third may be observed near the upper end of the patch. But in cases of non-specific intestinal congestion pigmented villi and the shaven-beard appearance of the patches were more frequent *post-mortem* observations than tumefaction and ulceration of the glands of Peyer.

These results of a completed study of the accumulated material relating to diarrhœa necessarily deprived this pigmentation of the patches of its assumed significance in connection with typho-malarial fever. Dr. WOODWARD was prompt to recognize this fact. He observed:‡ "The discussion of the interesting question of the relation of the lesion just described to a particular form of malarial fever must be postponed to a subsequent chapter; it must suffice at present to express the conviction that the intestinal lesion in the class of fever cases referred to presents nothing by which it can be distinguished from the lesions observed in other cases in which the febrile phenomena are not well marked or at least present no specific characters."

This intimates that there is no specific intestinal lesion by which the malarial form of typho-malarial fever may be distinguished from the malarial fever which, beginning as an intermittent or a remittent, becomes, like typhoid, subcontinuous, and in its later stages is attended with typhoid, *i. e.*, adynamic symptoms.

Had Dr. WOODWARD been spared to complete his work one or other of two courses was open to him in the discussion of his malarial group of typho-malarial fevers: Either to relegate this group to the class of purely malarial fevers or to argue that typhoid fever is non-

* See page 35 of the pamphlet, Philadelphia, 1876. † See pp. 298 *et seq.* ‡ Page 302.

Am. Photo-Relief Printing Co., 1002 *Arch St., Philadelphia.*

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specific in its character and may supervene on an intestinal congestion such as may be due to the incidence of the malarial poison when sufficiently prolonged to involve the patches of Peyer, or in the presence of constitutional abnormities or peculiarities in the environment tending to the development of that typhoid state which is the usual accompaniment of an ulcerated condition of these patches.

It is needless to say that the correct course appears to the writer to be that first indicated, as he has been led to adopt it by a clinical and pathological analysis, the various processes of which have been carried on in full view of the reader of the preceding pages. Moreover, if the argument be continued on the basis of the similarity between the condition of the patches in intestinal catarrh and in the malarial group of the typho-malarial fevers it is equally conclusive: The cases in question were either examples of a subcontinued malarial fever with adynamic symptoms, showing on *post-mortem* examination—if the intestines were implicated, which was by no means the case in every instance—the anatomical lesions which characterized cases of intestinal catarrh and not those of typhoid fever, or they were cases of typhoid fever so modified by the presence of malaria that the full action on the aggregated glands was prevented. But while, as has been shown in the course of this report, there is ample testimony in support of the former alternative, the latter is based on the assumption that typhoid fever may be present without showing its existence by its usual action on the aggregated glands of the intestine. If this assumption were allowed, typhoid fever, as known to the medical profession for the past sixty years, would itself cease to exist, and in the clinical and pathological chaos that would result it would manifestly be useless to attempt the identification of a typho-malarial fever when its typhoid element was acknowledged to be unrecognizable. Fortunately the assumption is suggested by facts which may be used instead to strengthen and sustain views that are in accord with our present knowledge and past experience: Undoubted malarial fever may assume clinically the appearance of typhoid, while at the *post-mortem* examination the lesions of typhoid are not present. The general experience that has found a particular lesion in all cases of typhoid naturally concludes that in these malarial cases there was no typhoid element. It requires a forced rendition of the facts to construe them into a proof of the modification of the typhoid lesion by the coexisting malaria. If malaria exert such an interference in one case it should do so to a greater or less extent in all the cases of typhoid which it complicates; yet the *post-mortem* records that have been submitted contain many cases in which, although the malarial complication was strongly marked clinically, the typhoid lesions were as distinct as in a specially selected case of unmodified typhoid. It must therefore be concluded that the absence of the typhoid lesion implies an absence of the febrile condition which is its cause, and not an interference with the development of morbid changes in glands that are known to be not necessarily affected by the poison which is assumed to have caused the interference.

The only course open for an attempt to sustain the malarial group of the typho-malarial fevers in their position of modified typhoid fevers is to deny the specific character of typhoid fever and show that there is a more intimate relationship between malarial and typhoid fevers than has hitherto been allowed. This involves the subversion of the generally accepted views of typhoid fever and the establishment of typho-malarial fever as the typical and central figure of the subcontinued fever series, which becomes paroxysmal or continued according as certain inflammatory processes are restricted to the general surface of the intestinal mucous membrane or invade the substance of the agminated glands, results which are

due not to specific differences in the febrile cause but to accidental circumstances pertaining to the constitution, age and hygienic surroundings of the affected individuals. To sustain this position in the face of our present knowledge of the malarial and typhoid febrile conditions is impossible. The natural history of the causes of these conditions must be shown to be wholly at variance with our present conceptions before any attempt of this kind can be other than a work of the imagination.

If the cases that have been instanced in the analytical summary as presenting pigmentation of the mucous membrane of the intestine be examined it will be found that, where the patient's condition for some time before death is mentioned, diarrhœal attacks form invariably a part of his history. Notable pigmentation was of much greater frequency in the continued malarial cases than in those which presented a distinct typhoid element: in the former pigmentation existed in nearly one-third of the cases, and in the greater proportion of these the deposits were specially marked in the patches of Peyer. This corresponds with what has already been observed concerning the intensity of the congestion in such cases. In the true typho-malarial and the mixed series the proportion of pigmented cases was much smaller; while in the typhoid series there occurred no instance in which deposits had formed in the patches, and but two in which the solitary glands were their site, although the mucous membrane of the colon presented in five cases an alteration of color which must be ascribed to an antecedent hyperæmia. This absence of the shaven-beard appearance from the patches in typhoid is susceptible of explanation on the one hand by the rarity of that intense congestion which tends to relief by extravasation, and on the other by the removal of each ecchymosed spot by subsequent ulceration or sloughing.

The prevalence of the pigmented intestine in the continued malarial fevers that were reported as typhoid or typho-malarial is worthy of remark as compared with its infrequency in the fatal cases of paroxysmal fever. Thus, while, as has been stated, 31.7 per cent. of the former presented pigmentary deposits in which the aggregated glands were generally participants, only one, case 98, of twenty-five paroxysmal cases, in which the intestines were morbidly affected, had the patches of Peyer blackened, and in only two, 57 and 94, was the mucous membrane of the large intestine the site of these deposits. It will be remembered, however, that death in the paroxysmal cases occurred usually after a short illness, while in the continued malarial cases that were reported as typhoid or typho-malarial the fatal attack was prolonged. Time was afforded in the latter for the development of a pigmented condition, which in the former was represented by an existing congestion such as led to ecchymoses in the pernicious cases 97–99, or gave a deeper color to the apices of the solitary glands in 69, or produced in 59 an extravasation of blood. If these cases are taken into consideration as presenting the earlier stages of the development of the pigmented condition it will be found that the proportion of such cases in the paroxysmal fevers did not differ from that in the continued malarial series.

The mesenteric glands.—The writers of the *post-mortem* records seldom gave a detailed account of the condition of the mesenteric glands; but enough has been said to show that their affection was similar to that observed by Louis* in his classical typhoid

* See note, p. 426, *supra*. Rokitansky, *op. cit.*, *supra*, page 443, describes the mesenteric glands as congested and swollen during the initial stage of acute catarrhal inflammation of the ileum. Their tumefaction is progressive with that of the closed glands of the intestinal lining. They attain the size of a bean or pigeon's egg and sometimes that of a hen's egg, those nearest the bowel showing the most enlargement; their greatest size is reached during the congestion attending the destruction of the intestinal follicles, when they are often so soft as to fluctuate under pressure. They appear to degenerate into a medullary substance, sometimes firm and white, at other times softer and of a grayish-red or pale-red color. The areolar tissue enveloping them shows a varicose vascular network; occasionally their serous covering becomes inflamed and perhaps ruptured, giving rise to hemorrhage and peritoneal inflammation, and their parenchyma is converted into a yellow or yellowish-red, thick and diffluent mass. When the necrosed

Heliotype. *James R. Osgood & Co., Boston.*

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enlarged and considerably infiltrated with metastatic masses. When fresh this spleen was so soft as to be easily torn with the finger; it was partly bluish-black in color and partly of a livid blood-color, while the so-called metastatic masses were bright yellow; these foci consisted of granular matter in which were embedded the partly disintegrated anatomical elements of normal splenic structure. Nevertheless the proportion of cases in which the spleen was small or normal in size and consistence was greater in the malarial than in the typhoid cases. Similar conditions were found in the fatal cases of the paroxysmal fevers.* The spleen presented abnormal changes in 93.3 per cent. of those typhoid cases in which its condition was observed and recorded and in only 65.4 per cent. of the malarial cases. In the typho-malarial and mixed series a medium as to frequency is found, the former furnishing 81 and the latter 75 per cent.; but although the proportion of abnormities in these cases was greater than in the continued malarial series, the proportion of cases in which a pultaceous or purulent degeneration had taken place was not so great.

The LIVER in our typhoid cases differed from that of LOUIS's observations in the very general presence of an augmentation of volume: Although noted in but five of his forty-six cases, enlargement is mentioned in a majority of such of our records as call attention to abnormities. The somewhat enlarged, pale, perhaps fatty, softened and sometimes congested state of the liver in typhoid was present also, to a certain extent, in the malarial cases, a result probably due in both instances to the action of the disease-poisons; for since these manifest their operation by similar pyrexial symptoms and disordered secretions a similarity in the secondary morbid lesions might naturally be expected. But among the malarial cases was found a larger proportion of congested livers, and instances of adhesion and suppuration give evidence that the inflammatory conditions were more intense as well as more general; there was also found that darkening or bronzing of its substance which was observed in the paroxysmal but not in the typhoid fevers. The liver was altered in eighteen of twenty-nine typhoid cases in which its condition was observed and recorded, *i. e.*, in 62 per cent., in thirty-two of fifty-three cases, or 60 per cent. of the malarial, in twenty-six of forty-five cases, or 58 per cent. of the typho-malarial, and in eighty-seven of one hundred and forty-two, or 61 per cent. of the mixed series. The bronzing and occasional disorganization found in continued malarial cases were found also in the typho-malarial and mixed cases.

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by which its augmentation was effected. While enlarging the organ is tense, firm and uniformly dark bluish-red, with the trabecular structure barely seen in the outswelling pulp-mass; but as the disease advances its substance becomes softer, the pulp assumes a pultaceous character and the stroma has less cohesion. Later the capsule becomes wrinkled, white, cloudy and thickened, while the spleen itself diminishes in size. These changes depend upon an alteration of the blood-contents and of the constituent elements of the spleen. In their entire character they exhibit great similarity to those observed in the lymphatic system of the small intestine. There appear single nucleated lymph-cells of normal size and larger, together with great numbers of large many-nucleated cells, which latter compose in great part the contents of the venous sinuses and are profusely distributed in the larger splenic veins. This is especially the case in the commencing stage of the splenic swelling; in the second and third weeks the large cells are found in vast numbers in a state of partial division, while in later stages the single nucleated cells preponderate. The original lymph-cells are supposed to be the source of the cellular development. Coincident with the increased cell formation the trabeculæ become extended and the vessels tense. The Malpighian bodies are mostly distinct, somewhat enlarged and well supplied with blood; at first they are abundantly filled with cells, among which are a moderate number of the larger many-nucleated corpuscles. As long as cell proliferation continues active the firmness of the splenic tissue is maintained, but when it begins to subside, about the end of the third week, the tissue becomes soft. With the evacuation of the cell-structures the tension and volume of the splenic substance diminish and the larger trabeculæ contract; but the fibrous reticulum and capsule remain thickened during the further progress of the resolution. The cell elements leave the spleen by the vessels leading from the organ; but as comparatively few of the large many-nucleated cells are seen in those vessels it is inferred that, considering their abundance in the splenic tissue, they are broken up into small cells in the efferent channels. At this period dark-red and even black hemorrhagic foci are occasionally found scattered throughout the substance of the organ. Infarction is generally confined to one portion, a wedge-shaped mass, having its base directed towards the splenic periphery. So long as the infarcted portion continues firm its tissue preserves its ability to undergo a progressive fading, shrinkage and isolation from the surrounding parts by a dense capsule of connective tissue; but when the infarction is large it is prone to become softened into a pultaceous grayish-brown mass. If the capsular tissue has already been formed the portion within it, as a rule, alone becomes disorganized, but if it is unformed the softening process may extend beyond the infarction and lead to peritonitis. According to KLEIN, the cells in the distended blood-paths of the spleen in typhoid cases resemble lymphoid cells changed in the same manner as those of the intestinal and mesenteric glands.

* See *ante*, page 146.

The two cases 111 and 199 are of interest in connection with that rare *post-mortem* condition emphysema of the liver. In the first case, which occurred in the service of Surgeon E. B. BENTLEY, U. S. Vols., at the Slough hospital, Alexandria, Va., the patient had recurring chills followed by fever, sleeplessness, delirium and jaundice, with death on the ninth day after admission. The patches of Peyer and mesenteric glands were enlarged and the liver increased in size, its right lobe honey-combed, "full of air and of a very peculiar appearance," and its left lobe normal in texture but of a yellow color; the kidneys were normal. Specimen 639, Army Medical Museum, is a section of the right lobe of the liver from this case, showing the honey combing of the organ by dilated ducts which, according to the statement of the Catalogue of the Museum, was filled when recent with a yellowish serum-like fluid. This statement makes no mention of the presence of emphysema. The second case was reported by Assistant Surgeon HARRISON ALLEN, U. S. Army, in charge of the Lincoln hospital, Washington, D. C. The patient died on the seventh day after admission, but the existence of bed-sores over the sacrum and trochanters showed that he must have been sick for several weeks. He suffered from high fever and delirium, frequent retching and violent diarrhœa. The patches of Peyer were ulcerated; the mucous membrane at the ileo-cæcal valve thickened, indurated and blackened and in the colon pale but dotted with spots of black pigment. On the left side of the abdomen, about two inches below the diaphragm, was a subperitoneal abscess containing four drachms of pus. The surface of the liver was generally of a grayish-blue color, but anteriorly the right lobe had a more healthy appearance; minute collections of air were disseminated through its parenchyma, which was soft, of the color of sanious pus and possessed of a disagreeable odor; the air-cavities and the transverse sections of the portal veins gave a honey-combed appearance to the interior. The kidneys were in a similar emphysematous condition, the distinction between the pyramidal and cortical portions being almost obliterated.

Perhaps to these might be added case 137, as presenting the color, odor and consistence of the fully-developed emphysematous case, although no air is mentioned as present in the tissues. This case, also reported by Dr. ALLEN of the Lincoln hospital, died on the third day after admission, but no clinical history has been preserved. The patches of Peyer in the lower part of the ileum were surrounded by congestion and had ragged surfaces and purplish edges. The liver, of a dull greenish color, evolved a peculiar chicken-coop odor and was so soft that the finger could be passed through it in every direction; the gall-bladder contained an ounce of dark ochre-colored bile. The kidneys were congested.

FRERICHS* refers to *emphysema hepatis*, and cites GRAVES and HASPEL as instancing cases in which an abscess or hydatid cyst, after the discharge of its contents into the stomach or intestine, became filled with gases from the gastro-intestinal canal owing to pressure exerted by the abdominal walls or muscular tunics of the intestine; but he acknowledges that it is more difficult to account for those cases in which air cavities, from the size of a millet-seed to that of a pea, are found permeating the hepatic substance. He met an instance of this kind in the body of a woman who died from purulent inflammation of the joints, death having been preceded a short time by abortion and the appearance of petechiæ. He also cites some cases observed by others,—by STOKES in a person who died from the rupture of an aneurism into the œsophagus, by LOUIS in a tubercular patient, by CAMBAY after dysentery and peritonitis and by PIORRY after small-pox.

* *A Clinical Treatise on Diseases of the Liver*—New Sydenham Society, London, 1861, Vol. II, p. 309.

In addition to his tubercular case above cited Louis* found this emphysema of the liver in certain cases of acute disease; but in the typhoid affection he never encountered it, and he comments with astonishment on what seems to him a fact, that this apparently putrefactive condition of the liver should be absent in a disease which has been long known as putrid fever while present in other acute maladies that are not so intimately associated with the idea of putridity. Emphysema of the liver in his cases coincided with a similar condition of the neck and limbs.

J. Forsyth Meigs has reported a case in which the liver was found in this condition after typhoid fever.† In this case there was much exhaustion, which was regarded as due to an unusual destruction of the red corpuscles of the blood indicated by the amount of their coloring matter in the urine. The patient died after profuse hemorrhage from the bowels about the eighteenth day of his attack. The patches of Peyer and many of the solitary glands were ulcerated and the mesenteric glands enlarged, vascular and softened. The liver was much enlarged, brownish-yellow, spongy and crepitant, so light as to float in water and so soft that the finger could readily be thrust through it; on pressure much dirty, frothy, thin liquid escaped, which looked like ichor but not like pus; the gall-bladder was filled with thin yellowish bile. The kidneys were enlarged, dark colored and congested; they crepitated distinctly but did not float in water. There was subcutaneous emphysema of the sides of the neck and thorax, and much discoloration from stasis in the dependent parts of the body. On microscopic examination, the liver was found to be fatty; fat in large drops was scattered over the field, and all the small angulated and irregular cells contained much fat in minute refractive points. On the other hand, the kidneys were not fatty, but the tubes were large, swollen and crowded with dark cloudy cells. Dr. Meigs remarks that there was no emphysema of the neck before death, or at least none was observed, as he believes it would have been had it existed; but he considers it difficult to suppose that the singular cribriform and spongy character of the liver could have been produced in the eleven hours and a half which elapsed between death and *post mortem* observation, especially as there was no decomposition of the tissues in other parts of the body, and assuredly none in the kidney, which also, although to a less extent, was emphysematous.

The honey-combing of the liver in case 111 was certainly due to dilatation of the ducts, by a serum-like fluid, according to the statement in the Catalogue, connected with which was the jaundice of the clinical history; but the language of the reporter leaves no room for doubt that emphysema was associated with this condition. Without additional cases and more precise details it is difficult to say what may have been the origin of the emphysema; but in view of similar conditions in the kidneys in some of these cases, and in the muscles of the neck in case 98, it seems probable that it was the result of *post-mortem* changes. In tissues that have become so profoundly altered from the normal condition during life it is not surprising that chemical reactions, in advance of bacterial or putrefactive changes, should have given rise to the evolution of gaseous products as soon as vitality ceased to act as a preservative.

* Paris, 1829, t. I, p. 309.

† *Philadelphia Medical Times*, 1872–73, Vol. III, p. 1.—Referring to the rarity of this condition of the liver Dr. Meigs says: "In that great treasure-house of pathological medicine, Rokitansky's Pathological Anatomy, I cannot find a single specific reference to it. I have looked through seven volumes of the Year-Books of the Sydenham Society and did not find a case. Bamberger, in Virchow's Hand-book of Pathology and Therapeutics, in the chapter on the liver, makes no mention of it. Neither Budd in his Treatise on the Liver, nor Watson in his Practice, nor Graves, who saw so much typhus in Dublin, in his great work on the Science of Medicine, nor the writers on Typhoid Fever and Diseases of the Liver in Reynold's System of Medicine, nor the Compendium de Médecine Pratique even glance at it."

The GALL-BLADDER in the continued fever cases presented no special characteristics. It was large or small, empty, distended or charged with various quantities of bile, usually dark-colored and viscid, but sometimes thin, straw-colored or watery. As accidental complications may be mentioned the perforation of its walls in case 95, in which constant nausea and vomiting, jaundice and subsequent peritonitis obscured the symptoms of typhoid, and its disorganization in 327 as the result of its participation in a general peritonitis.

The PANCREAS was normal in twenty-seven of forty-one observations and but slightly altered in the remaining fourteen, the alteration consisting of an asserted hardness, softness or change of tint. The resistance of this gland to the typhoid and malarial poisons may be fairly assumed from a consideration of the many cases in which it was healthy, although the other abdominal organs were extensively diseased. Even when the parotid gland became affected it does not appear that the susceptibility of the pancreas was increased, for while the condition of the latter was stated in but one of the cases in which the parotids were inflamed it was normal in that case, 263. But the inference that on this account there is a greater difference between these glands than is generally supposed is hardly warranted, since the submaxillary glands were so rarely affected.

The KIDNEYS were less frequently affected in the continued fevers than the liver or spleen, but the morbid changes that were observed were of a similar character. The large number of instances in which their condition was not stated detracts from the value of the statistics for certain purposes; but of the cases that were examined about one-half were reported as in a healthy condition. In 52 per cent. of the typhoid series the kidneys were more or less altered; in 57 per cent. of the continued malarial cases; in 35.7 of the typho-malarial, and 42.6 of the mixed series of cases. It is inferred from these figures that although an altered condition of the kidneys was as frequent an attendant of malarial as of typhoid fever, the conjunction of these was not expressed by an increased frequency in the lesions of this organ. Nevertheless an examination of the analytical summary, by showing a somewhat greater prevalence of acutely inflamed cases in the typho-malarial and mixed series, suggests that the coincidence of the febrile poisons may have been manifested by an increased gravity of the lesions. The kidneys were congested, in many cases soft and flabby and in some pale and fatty; occasionally the congestion resulted in ecchymoses, and at times the inflammatory action proceeded to suppuration. The emphysematous kidney in case 199 has already been referred to in speaking of the lesions of the liver.

As has been shown in a previous part of this chapter,* no general connection was observable between dysuria or retention, and delirium or stupor, although it is probable, as argued by MURCHISON, that cerebral symptoms are in some instances the result of an accumulation of urea in the blood.

III.—THE ORGANS OF RESPIRATION AND CIRCULATION.

As the condition of the LARYNX and TRACHEA was observed in so few of the cases, the relative frequency of their lesions can be ascertained only by the figures supplied by Dr. HARRISON ALLEN.† In only three of his cases of camp fever was the trachea or larynx implicated. In one the fauces and epiglottis were covered with false membrane, and the margins of the latter and mucous lining of the larynx were ulcerated; in a second there was thickening of the membrane but no ulceration, and in the third a decided inflammation of

* See *ante*, pages 298 and 308.

† See *ante*, page 433.

the trachea unaccompanied by laryngitis or pneumonia. From the paucity of such lesions in thirty-five cases it seems probable that the reason why the larynx and trachea were not more frequently mentioned in our *post-mortem* records was the absence of morbid appearances in these parts. Observations were made in six of the typhoid, eight of the malarial, four of the typho-malarial and seventeen of the mixed cases. The alterations consisted of thickening of the lining membrane by congestion, œdema, exudation into the submucous tissue or the development of false membranes on its surface; not unfrequently the membrane was ulcerated,* and occasionally small abscesses were formed in connection with the laryngeal cartilages. Unquestionably these conditions were frequently the causes of the alteration or loss of voice and the dysphagia that were at times present in the progress of the fever. Œdema was a dangerous lesion in some instances, as in 339, in which it caused death by occluding the rima glottidis. Perhaps also this was the cause of the sudden death in 36; in this case, as there was œdema of the lower extremities and effusion into the serous sacs, the fatal result may have been occasioned by the pericardial effusion, which suffices to account for the masking of the heart-sounds, the dyspnœa and præcordial pain; but it is not certain, in the absence of *post-mortem* observations directed to the larynx, that an œdematous condition of the glottis arising from the anæmia may not have been the immediate cause of death. Generally, however, œdema glottidis was connected with local congestive processes. Occasionally pseudomembranes were the proximate cause of the fatal issue, as in cases 122 and 308; but it does not appear that diphtheria was specially a complication of typhoid or other continued fevers, for it appeared in patients enfeebled by other diseases and, indeed, by gunshot wounds. Its occurrence seems to have been determined by the deteriorated condition rather than by the specific cause of the deterioration.†

Emphysema of the neck has been attributed to the existence of ulcers in the larynx;‡ but in the only instance, case 98, in which this condition of the cervical cellular tissue was noted, the larynx does not seem to have been examined, and the emphysema, on account of a coexisting ecchymosis, was referred to a hypothetical ante-mortem violence. In case 12 the œdematous condition of the neck was apparently connected with processes affecting the throat, as the epiglottis was much swollen.

The condition of the BRONCHIAL TUBES was seldom observed or noted, but they occasionally appear to have been congested irrespective of the condition of the pulmonary tissue. In a few cases, as 281, 331 and 362, there were distinct evidences of inflammation.

The condition of the LUNGS was variously reported by our medical officers as engorged, congested, œdematous, splenified or hepatized. They weighed more than in the healthy state from the afflux and stagnation of the blood and the subsequent exudation or transudation of its elements in certain parts, generally their lower and posterior portions. Undoubtedly this condition arose, in many instances, during the great prostration that immediately preceded death, for it was found in cases in which there had been no symptomatic manifestation of its presence; but in other cases the morbid action was of a more active character, leading to a true hepatization. Generally the sanguineous condensation was diffuse, but it was

* According to LIEBERMEISTER, *Ziemssen's Cyclopedia*, Am. Ed., Vol. 1, p. 166, laryngeal ulcers are of comparatively frequent occurrence in typhoid. He cites HOFFMANN as having found them in 28 of 250 autopsies of typhoid fever, and GRIESINGER in 26 per cent. of his fatal cases.

† See diphtheria, *infra*, p. 739.

‡ MURCHISON refers to WILKS as having demonstrated the association of emphysema of the neck with ulcer. "A boy, aged 12, became emphysematous on the twelfth day of an attack of enteric fever, the emphysema commencing in the neck, spreading to the face, arms and chest, and greatly impeding deglutition. Death occurred on the twenty-second day, when it was found that the air had escaped through a sloughing ulcer of the larynx, situated at the posterior junction of the vocal cords."—*Op. cit.*, p. 558.

occasionally circumscribed in lobular masses as if the result of catarrhal processes. Owing to want of definition in the records it is uncertain to what extent hemorrhagic infarction conduced to the production of the morbid appearances.

The lungs presented a larger proportion of morbid changes in the typhoid than in the malarial cases. They were altered from the normal in 85.3 per cent. of thirty-four typhoid cases in which their condition was noted, and in but 55.2 per cent. of fifty-eight malarial cases, the typho-malarial and mixed cases taking a middle position in this respect, the former presenting 62.7 per cent. of fifty-one cases and the latter 71.2 per cent. of one hundred and sixty-three cases; but while the lungs, like the spleen, were less frequently affected in continued malarial than in typhoid fever, they presented in the individual cases of the former more extensive or aggravated diseased conditions, as manifested by the occurrence of ecchymosis with congestion and by the greater frequency of purulent collections. Hurried respiration, although generally due to local hyperemic conditions, was in some instances attributable to nervous agitation, to febrile excitement, to pressure on the lungs by the tympanitic abdomen, or, as in case 25, to a combination of these conditions.

THE PLEURÆ.—As compared with the frequency of congestive and inflammatory processes in the parenchyma of the lungs, morbid changes in the pleural membrane were of great rarity. Adhesions unconnected with the febrile attack are of course excluded from the list of abnormal appearances. The pleural cavity sometimes contained a serous effusion, due in some instances to a transudation from engorged capillaries, but in others to more active processes, as may be inferred from the flakes of lymph or purulent turbidity described as present; recent lymph appeared occasionally on the surface of the membrane and the serous effusion was sometimes tinged with blood.

This rarity of the pleural affection in continued fevers among the white troops is strongly contrasted, according to the published statements of Surgeon ROBERT REYBURN, U. S. Vols., by its frequency and fatality among the negroes. In a report* which gives the results of the treatment of 7,949 cases of sick and wounded freedmen in the District of Columbia from June 1 to December 31, 1865, he states that typhoid fever constituted the most fatal although by no means the most numerous class of cases; there were one hundred and sixteen cases, of which forty-nine, or nearly 41 per cent., proved fatal. He considered that pneumonia, which so often occurred in the progress of typhoid fever affecting the Caucasian race, became in the negro pleuro-pneumonia of a low grade, and was generally accompanied with a large serous or sero-sanguineous effusion, which after death was found filling the pleural cavities. In fact, inflammation of the serous membranes seemed to be more frequent and dangerous among negroes than among whites. That the effusion was not a *post-mortem* transudation was proved by its quantity, which entirely precluded that idea, and by the fact that in many of the cases percussion revealed its existence during life.

THE PERICARDIUM was less frequently affected than the pleuræ. Sometimes an excess of serum was present, and occasionally this was tinged with blood or associated with a slight redness of the membrane. Rarely, as in 90, 206, 276 and 307, there were such indications of inflammatory action as fibrinous flocculi in the effused liquid, exuded lymph on the serous surface, or a thickening of the membrane. Many of the cases presenting these pericardial changes had the lungs or pleural cavities in a morbid state, but in some, as 170, 206, 262 and 328, there was no coincident implication of these parts.

*See [illegible]

The condition of the HEART was mentioned in less than one-half of the cases; and in these it was frequently said to have been normal or healthy, as, for instance, in 82 per cent. of twenty-two typhoid cases, in 75 per cent. of forty-eight malarial cases, in 77.5 per cent. of forty typho-malarial and in 77 per cent. of one hundred and thirty-five cases of the mixed series. Usually, when described as altered from the normal, the words pale, anæmic, soft, flabby, flaccid or atrophied were employed to express its condition; in a few cases it was said to have been fatty. From these observations it would be difficult to infer the frequency and great importance of the degenerative changes in the muscular tissue of the heart induced by the continuance of the febrile movement as demonstrated by the investigations of HAYEM,* VALLIN† and others; but it is known that these changes, involving a cloudiness of the striæ of the muscular tissue apparently by albuminous granules in the fibres and interfibrillar protoplasm, and even a fatty degeneration of the muscle, are gradual in their progress and may be shown by microscopic examination to be notably advanced although the organ may not attract attention by changes in its macroscopic characters.

But although the heart was so frequently reported in a healthy condition by the *post-mortem* observers, the attending medical officers recognized in the symptoms a tendency to a failure in the powers of this organ, and were inclined to attribute cases of sudden or otherwise unexplained death to this cause. Nevertheless, in the series of cases that have been submitted there is not one case that may with certainty be instanced as having proved fatal by the sudden failure of a degenerated heart. In case 184, which had a suddenly fatal termination during an apparently favorable convalescence, the heart was flabby. In the large number of cases in which death was the result of progressive prostration, and which were unmarked at the autopsy by the presence of a particular lesion known to be mortal, it is possible that the heart was materially implicated, but the records do not say so. Thus, in cases 13 and 14, in which it is stated in terms that the cause of death was asthenia, the condition of the heart is not mentioned. On the other hand, while there is no certainty that this degenerated condition of the heart was the cause of death in the cases in which it was present, it is deserving of note that in a large proportion of them there was no lesion of the viscera that could be cited as the immediate cause of the fatal result. In about one-third of the three hundred and eighty-nine cases that have been presented the cause of death could be ascribed to some particular complication or lesion, as coma, hemorrhage, perforation, pneumonia, etc.; but of the thirty-nine cases in which the heart was stated to have been pale, anæmic, softened, flabby, atrophied or fatty, a lesion to which death might with probability be assigned was found only in six or seven cases,—gangrene of the feet in 112 and 278, gangrene of the intestines in 311, perforation of the bowels in 347 and pneumonia in 243, 333 and perhaps 182. In view of what is known concerning the degeneration of the muscular tissue of the heart in continued fevers it is not unlikely that death in many of these thirty-nine cases may have been due, to a certain extent, to the special influence of this morbid change.

Physiological considerations lead to the expectation of a greater frequency of congestion of the lungs in connection with a degenerated condition of the heart than in those cases in which this organ was reported healthy; but this expectation is not sustained by an examination

* *Recherches sur les Rapports existant entre la Mort Subite et les alterations vasculaires du Cœur dans la Fievre Typhoide*, par GEORGES HAYEM. Archives de Physiologie Normale et Pathologique, Paris, 1869, t. 2d, p. 699.

† *Des Altérations Histologiques du Cœur et des Muscles Volontaires dans les fièvres pernicieuses et remittentes*, par M. E. VALLIN.—Memoires de Médecine, &c., Militaries, 3me serie, t. XXX, Paris, 1874.

of the records. The condition of the lungs was not stated in four of the thirty-nine cases in which the heart was said to have been degenerated; in twelve the lungs were normal and in twenty-three congested or more actively diseased; they were, therefore, altered in 66 per cent. of the cases in which their condition was reported. On the other hand, in looking at the cases in which the records do not state the heart to have presented this flabby condition of its walls, the lungs were hyperæmic in one hundred and eighty-six, normal in eighty-five, while in seventy-nine their condition was not stated, *i. e.*, they were congested or otherwise altered in 68.7 per cent. of the cases in which their condition was recorded. In view of these figures, showing the association of a larger proportion of congested lungs with hearts that did not attract attention by their morbid conditions than with those that were reported as more or less degenerated, it is to be inferred that pulmonary congestion in these fevers was unconnected with the condition of the heart or that the naked-eye appearances of the latter organ gave by no means a true impression of its actual condition.

The contents of the chambers of the heart were noted in ninety-six of the three hundred and eighty-nine cases of continued fever. In nine of these it is stated that no clots were present: In 48 the heart was pale; in 329 firm; in 137 flabby; in 165 and 277 it was said to have weighed nine ounces; in 96 it was reported large, the left ventricle empty and the right containing uncoagulated blood; in 150 and 190 the blood was uncoagulated; in 194 there was a thin wafer-like formation on the tricuspid valve. Manifestly, from the small number of cases in which the heart was reported as having been found free from clots, its contents were specially noted, as a rule, only when the attention of the recorder was attracted by these coagula.

Clots occurred with greater frequency in the cavities of the right side than in those of the left. In a few instances the records do not specify whether the coagula or fibrinous concretions were formed in the right or left side or in both sides, the statement being simply as to their presence in the heart. But if their existence in the chambers of both sides be assumed in these cases, it will be found that of eighty-seven recorded cases of heart-clot both sides were affected in forty-nine. Of the remaining thirty-eight cases the right side contained clots in thirty-five and the left in three instances. Of those containing clots in the righ chambers only, the left side contained fluid blood in two and no clot in two, while in thirty-one assurance is conveyed of the absence of clots by the fact that their presence was not recorded. In the cases containing clots in the left chambers only, the right side contained fluid blood in one instance and no clot in another; in the third no statement of its contents is given. The greater liability of the right side of the heart to the accumulation of coagula may be gathered from these figures. Clots were noted in the right cavities of eighty-four and in the left cavities of fifty-two hearts.

But the character of the coagulum had a tendency to vary according as the right or left chambers of the heart were its seat. Of the eighty-four coagula noted in the right cavities fifty-six consisted of fibrinous concretions or deposits, frequently filling the chambers and projecting into the great vessels, eight were venous or black clots, six a mixture of fibrinous deposits and venous coagula, while in fourteen the appearance of the clot was not entered on the record. Of the fifty-two coagula in the left cavities twenty-five were fibrinous, eight venous, seven mixed and twelve of unstated appearance.

Dr. Woodward has discussed the general question of heart-clot in connection with it

occurrence in diarrhœa and dysentery.* He concluded that although fibrinous coagula may be formed during life they must be regarded in the vast majority of instances as occurring during the death agony. He pointed out that no facts had been presented to show that clots were formed more frequently in cases of sudden death than in cases of the same disease in which death took place in the usual way and without any symptoms referable to the heart; and that there was no evidence that the clots in the one group of cases differed from those that occurred in the others as to size, texture, adhesions, etc. Dr. WOODWARD dealt with this question before the whole of the data relating to it had been submitted. It is true the further evidence contained in the records does not unsettle his conclusions; but if there had been before him the cases of heart-clot recorded in the chapter on the paroxysmal fevers,† with cases 271 and 377 of the continued fevers and 34 of the secondary pneumonias,‡ it is probable that he would have given a more emphatic acknowledgment of the existence of heart-clots of ante-mortem development, and conceded them as a whole a higher place in the scale of importance. The clots being manifestly of ante-mortem formation in some cases, it is assumed that they must have had a similar history in other cases unless it can be shown that in the latter they were of *post-mortem* origin. It is admitted that in most instances these clots were formed when the patient was about to succumb. The question at issue is their relation to the death agony. If they were formed during the agony and because of it, they had only a *post-mortem* value; but if, as seems likely from the cases presented, they were due to some cause which induced a temporary stasis or retardation of the flow of the blood through the chambers of the heart and brought about the agony by the rapidity of their development, they become of importance as the determining cause of the fatal issue in a large number of cases and as indicating the necessity of preserving patients from such influences as are known to be efficient in precipitating the deposition. When the predisposing conditions were not strongly marked, as in a case of typhoid in which the patient apparently retained strength sufficient to enable him to help himself in many of the necessities incident to his condition, a notable impress on the system might be required to constitute the immediate or determining cause of the fibrinous deposits, as the faintness which followed the exertion of rising to stool in cases 271 and 379, or the chill in 96 of the paroxysmal series. But on the other hand, in the presence of strongly predisposing conditions, such as were constituted by the prolonged duration of the fever, the existence of pulmonary hyperæmia, the exhaustion of diarrhœa or hemorrhage or the collapse attendant on perforation, the agency that determined the deposit and the closely-following fatal result might have been so slight as to have passed unnoticed; yet it may not be allowed that there was no exciting cause to occasion the deposit and death at that particular time.

In the majority of cases in which heart-clots were formed there was no lesion of the abdominal viscera, brain or lungs obviously inconsistent with the continuance of life. To no one in particular of the morbid changes in these organs could the rôle of executioner be assigned. The patients died from the totality of the morbid changes produced by the fever, typhoid or malarial, as the case may have been, or from the asthenic conditions bearing on the thread of life in the diarrhœal, pneumonic or other cases in which heart-clot was found as a *post-mortem* appearance;—or they died from heart-clot. But while the totality of the morbid changes was an inconstant quantity and of an uncertain value, the heart-clot was constant and efficient. In view of these considerations it is not surprising that our medical

* See p. 539 *et seq.* of the Second Part of this work. † See *supra*, page 138. ‡ See *infra*, page 788.

officers came to regard the fibrinous coagula as the immediate cause of the fatal issue in the cases presenting them. If a patient manifestly died, as in 110, from exhaustion consequent on repeated hemorrhage from the bowels, what may be conceived to have been the *modus operandi* of the cause? The hemorrhage predisposed to death by syncope, but the patient did not die until a clot had formed in his heart. He might have lingered for some time longer, notwithstanding the weakened action of the heart and the altered condition of the blood, had not some slight exciting cause determined the deposition of the fibrinous coagulum, which speedily interfered with the continuance of the cardiac flow. In case 112, in which the patient may be said to have died of gangrene of the feet, there was no condition, so far as is learned from the record, to occasion the immediate extinction of life until the deposition of fibrin was effected by some trifling, but under the circumstances all-sufficient cause. In some of the cases of peritonitis from perforation, as 45, 106, 156, 245 and 347, or that in which the gall-bladder was perforated, case 95, there appears no cause for the destruction of life at one particular moment rather than at another, if the fibrinous coagula in the heart are excluded from consideration. So, too, in such pneumonitic cases as 62, 198, 281, 357 and 369, in the pleuritic effusion of 340, and in the cases 217 and 304, which passed into death from a condition of coma, the agency that determined the occurrence of the fatal event at one time rather than another must be conceived to have been the development of these clots, owing to some temporary, and but for this not necessarily permanent, stasis in the passage of the blood through the chambers of the heart. Even in such a case as 122, in which the occlusion of the larynx by diphtheritic membranes may be readily assigned as the cause of death, it is probable that the immediate cause was the fibrin deposited in the heart during the stasis occasioned by the last of the suffocative paroxysms; since, if this had not occurred, the patient might have lived to have added another to the suffocative paroxysms that he had already experienced. The proposition that certain cardiac concretions are formed during life does not therefore rest exclusively, as it appeared to Dr. WOODWARD, upon the anatomical characteristics of the concretions;* but in some cases very clearly on the symptoms, and in others less clearly on positive and negative pathological evidences. These, indeed, suggest that sometimes the ordinary black coagulum may have an ante-mortem formation and be the cause of the death agony.†

Theoretically, one of the conditions provocative of the deposition of fibrin in the heart

* Page 541, Part II.

† The three following cases are briefly presented as illustrating the ante-mortem occurrence of all the varieties of clots that have been found in the heart: 1st. Fibrillated clots with central softening and arterial projections into their roots, which manifest with certainty their ante-mortem origin; 2d. Fibrinous clots which sometimes by their symptoms, as in the cases already given in the text, are known to precede and cause the death agony; 3d. Ordinary blood coagula, which are usually ascribed to *post-mortem* changes, but which may, in some cases, be the immediate cause of death. The first is related by JOHN G. M. KENDRICK, *Edinburgh Med. Jour.*, Vol. XV, 1869, p. 396. The patient, a woman of 19, was admitted Feb. 23, 1869, and died March 1. She was low-spirited and anxious, but complained only of slight cough and frontal headache, particularly towards evening. The most remarkable phenomenon of the case was a constant moaning of the patient during sleep, which was usually disturbed by frightful dreams. Nothing relieved this distressing symptom except propping her head and shoulders high with pillows. One morning, having been in her usual state till breakfast time, she suddenly became worse, dying at 10 A. M., apparently from congestion of the lungs. In the right auricle there was a white irregularly pear-shaped clot about the size of a large walnut, attached by several band-like processes at its narrow end to the musculi pectinati in the apex of the appendage. This clot, of firm consistence and slightly floccular appearance, had a cavity in its centre communicating with the exterior by a small rent in its substance. In the left auricle a firm white clot, attached to the columnæ carneæ, divided into two branches, one of which occluded the mitral orifice and the other extended into the aorta. Hypertrophy of the left ventricle, thickening of the anterior flap of the tricuspid valve and imperfect closure of the foramen ovale, were also observed. The lungs were much congested, and a few ounces of serum were found in the left pleural cavity together with a little serum in the pericardium, but there was no pericarditis. The clots, on microscopical examination, were found to be of fibrillated structure, holding in its meshes numerous corpuscular bodies with corrugated edges; several minute bloodvessels from the endocardium entered the root of one of the band-like processes of the clot in the right auricle, but, as far as could be observed, did not penetrate its substance; the epithelial layer of the endocardium, with the subjacent one of elastic tissue, seemed to be reflected upon the root of the clot and to run along with it for a few lines. The second case is given by Dr. PLAYFAIR, in the *Trans. Path. Soc.*, London, Vol. XVIII, 1867, pp. 68–70, as having occurred at King's College hospital. The patient had complained of pain in the right knee, but there was no swelling or tenderness of the part, nor feverishness. An alkaline mixture was prescribed. She was not seen next day. On the third morning she expressed herself free from pain and said she had passed a good night; but shortly after this she complained of feeling weak, and asked for a bed-pan that she might not have to leave her bed. She was then seized with hurried breathing and died before the house physician, who was sent for, could arrive. On *post-mortem* examination all the organs and structures of the body were found to be healthy. A firm solid clot of fibrin of

is that degeneration of its muscular fibre which in prolonged fever gives rise to the characteristic feebleness of the pulse. But the records do not show a greater frequency of clots in hearts reported pale, flabby, flaccid, etc., than in those reported healthy or which did not attract attention by any abnormal appearances. Of thirty-nine cases in which a degeneration of the heart was noted it was free from clots in two cases, its contents were not stated in twenty-nine cases, and it contained clots in eight cases, or in 20.5 per cent. of the number observed. The eight cases were 75, 276 and 347, in which fibrinous clots were present in both sides of the heart; 112 and 184, in which they were confined to the right side, and 148, 154 and 219, in which coagula, the character of which was not specified, were found, presumably, in both the right and left chambers. Of three hundred and fifty cases in which the condition of the heart was not stated or stated to be healthy, seventy-nine, or 22.5 per cent. of the whole number, contained clots. In view of what has already been advanced concerning the difficulty of deciding upon the actual condition of the heart from its microscopic appearances, this similarity in the percentages of heart-clot in the two sets of cases might be construed as indicating that the heart was possibly as much weakened in the cases in which its condition was not stated or said to have been healthy as in those in which the observers considered it flabby or otherwise degenerated.

As congestion of the lungs was so commonly present in the final hours of continued fever, occurring in as many as 68.3 per cent. of the cases, the frequent coincidence of clots in the heart with such congestion was to be expected. On questioning the cases for a possible connection between the presence of fibrinous clots in the right chamber of the heart and an engorged or other condition of the lungs interfering with the circulation of the blood through their tissues the following information is obtained:

In the five cases of typhoid in which separation of fibrin took place there were pulmonary conditions during the last stage of the fatal illness involving stasis of the blood-current.

In four of the fourteen cases of the malarial series in which there were fibrinous coagula in the right chambers the lungs were not seriously affected: In 259 some injection and a small nodular consolidation was recorded, but the weight of the lungs was inconsistent with any material engorgement; in 71 the lower part of the pleura on one side was said to have been inflamed, whence it may be inferred that had the pulmonary tissue presented any notable abnormity it would have been observed and recorded: in the two cases, 292 and 293, the lungs were expressly stated as having been in a healthy condition.

Of the ten typho-malarial cases presenting fibrinous clots in the right side the lungs were normal in four, 77, 95, 102 and 271, while in a fifth, 266, old pleuritic adhesions constituted the only abnormity. Moreover, 106, in which clots of an unspecified character were found in the heart, had the lungs in a healthy state.

Lastly, of the thirty-one cases of the mixed series in which fibrinous or partly fibrinous clots were observed in the right side of the heart, the lungs were normal in four, 167, 220, 221 and 347, while in a fifth, 166, the pulmonary disease consisted merely of a few softened tubercles in the apex of each lung.

From the above figures it may be calculated that congestion of the lungs was present in 75.4 per cent. of those fever cases in which the heart was found to contain fibrinous or mixed clots in the cavities of its right side. This increase in the percentage of lung disease in the heart-clot cases may be considered an expression of the influence of pulmonary

a pale-yellow color was found in the right side of the heart and pulmonary artery, adhering to the valves and fleshy columns. If this clot was formed during the death agony, why did the death agony occur? If the woman did not die of heart-clot, what was the cause of death? Dr. PLAYFAIR'S theory was that the clot had probably been forming during the night preceding the fatal result, and that so long as the patient remained quiet sufficient blood passed through the obstructed vessels to carry on the organic functions, but when she was obliged to exert herself there was a sudden call for blood, which could not be supplied through the occluded artery, and death resulted. Dr. JOHN A. LIDELL, of New York, gives the third case,—*Am. Jour. of Med. Sci.*, Vol. XLIV, 1872, p. 328,—that of an intemperate woman, who, when recovering from an attack of epileptic convulsions, was seized with dyspnœa, and died in an hour. The left pulmonary artery was obstructed with coagula. The heart was enlarged, fatty externally and flabby; its cavities were dilated and those of the right side filled with dark-colored clotted blood. The right lung was much congested and œdematous and the left intensely congested. It was supposed that the coagula in the artery had at first formed a part of the mass found in the right side of the heart, which was conceived to have originated in the stasis of the blood attending the epileptic convulsion, and that these, after the patient had recovered her consciousness, had been carried to the point where they were found. It is true the opinions of PLAYFAIR and LIDELL are merely conjectures, but they are conjectures founded on *post-mortem* and negative pathological evidences, in view of the history of the patient during the later hours of life.

conditions as predisposing to the formation of clots; but, in view of the relatively large number of these cases in which the lungs were in a healthy or comparatively healthy condition, the clots may not be referred for causation to the pulmonary congestion alone.

The opinion is very generally entertained that in the course of continued fevers the blood becomes progressively altered by the diminished nutrition of the patient and the abnormal action of the various organs concerned in elaboration and elimination, irrespective of the morbid changes that may be produced in it by the more or less direct action of a specific fever-poison. But the character of the blood-changes has not been sufficiently studied. When inflammatory conditions prevail in the system the fibrin, as is well known, becomes largely augmented. In such cases there would be no difficulty in appreciating the existence of a predisposition to coagulation. But the deterioration in fevers that are not symptomatic of acute inflammatory processes seems rather to tend to a *dissolutio sanguinis* manifested by the fluid and disorganized condition in which the blood is sometimes found after death, and by the ecchymoses, hæmaturia, epistaxis and other hemorrhages that appear in the progress of the disease. The one series of changes offsets the other so far as relates to the proportion of fibrin in the blood, and involves the occurrence of fibrinous coagula in the heart in corresponding obscurity.

Since *post-mortem* observations on the pale, weak and flaccid heart fail, as has been seen, to connect it as a strongly predisposing element with the heart-clot of fever; since pulmonary congestion and inflammation give but a slight increase in the percentage of these clots, and since the condition of the blood itself does not appear to be notably favorable to their development, it follows that for their production there is needful an immediate or exciting cause of an intensity proportioned to the inadequacy of the predisposing factors. Generally, no doubt, this is constituted by some unusual exertion on the part of the patient, perhaps sometimes by mental impressions; but accurate details of death scenes in fever are necessary to complete our knowledge of the immediate causes and progress of these fibrinous depositions.

The blood.—Few observations were made on the condition of the blood in the continued fevers. It was said to have been thin, uncoagulated or unusually fluid in the five cases, 25, 70, 96, 150 and 264. It is singular, in view of the general belief in the connection between a disorganized condition of the blood, such as exists in scurvy, and cutaneous blotches of a hemorrhagic nature, that in none of these cases is there a record of petechial spots or cutaneous or internal ecchymoses. In one case, 70, the liquidity of the blood was associated with œdema of the lower extremities. In case 204, in which a decrease in the number of white corpuscles was recorded, it is observed that the spleen was remarkably bloodless and the thyroid gland enlarged.

According to the records ecchymoses of the internal organs were rarely coincident with ecchymoses of the skin; whence it may be inferred that the former were in general the result of local congestions rather than of a deteriorated condition of the blood, and similarly, that the latter were frequently due to local rather than general conditions. Thus, in the typhoid series there were blood-clots in the pleural cavity in 31 and a bloody or reddish serum in the pericardium in 26. In the malarial series the lungs were ecchymosed in 258 and 288, and in the former the pleura contained a quantity of bloody serum; the stomach was ecchymosed in 262, the intestines in 91 and 365, and the upper surface of the cerebral hemispheres in 287. In the typho-malarial series the ileum was affected in 273, and in this

instance the skin also was implicated. In the mixed series of cases the pericardium contained reddish serum in 182 and 183; a similar effusion was found in the pleural cavities in 168, 333 and 340; the œsophagus was ecchymosed in 301 and 329, the stomach and bladder in 342, the ileum in 203, the colon in 162, 301, 318 and 370, the liver in 380 and the kidneys in 181 and 187. But in none of these cases, except 203 and 273, was the passage of the blood from the vessels of the internal organs associated with a similar leakage from those of the skin. The *post-mortem* records are, however, very defective so far as relates to the condition of the skin. This is shown by the number of typhoid cases in which, although petechiæ were present according to the clinical record, no mention was made of their existence by the *post-mortem* observer. It may be claimed, therefore, that in the cases instanced above there is no evidence that the skin was free from petechiæ, purpuric spots or ecchymotic blotches.

If, however, the cases which presented such spots or blotches be examined for concurrent leakage in the internal organs, it will be found that few instances of coincidence are recorded. The eight typhoid cases in which the skin was more or less spotted had no internal ecchymoses. The eight malarial cases that presented superficial blotches showed similar internal appearances in but one case, 386, in which the heart and the colon were affected. Of the four cases, 86, 93, 114 and 273, of the typho-malarial series that had the skin ecchymosed, the last mentioned had the ileum also spotted. Finally, of the nine cases of the mixed series that showed purpuric spots on the cutaneous surface only one, 203, had ecchymoses of the internal organs. Although petechiæ or other superficial colorations may have been overlooked by the recorders in cases presenting internal ecchymoses, it is not likely that the latter would have been overlooked where the record preserves the existence of the former. Thus it may be concluded that internal ecchymoses were not invariably associated with cutaneous transudation, and that in many instances each of these was due rather to local conditions than essentially to the deteriorated condition of the blood.

But perhaps the facts would be expressed with greater accuracy by the statement that while the situation of the extravasations and transudations was dependent on local conditions their existence was rendered possible only by the changes which had taken place in the blood. An abnormal state of the blood, frequently manifested by petechiæ, vibices, blood colored urine and passive hemorrhages has already been noted as characterizing pernicious cases of the paroxysmal fevers. In cases of continued fever of malarial origin a similar condition might naturally be expected. In typhoid cases it is difficult to assume a healthy condition of the blood, in view of the prolonged interference with the normal action of the various organs concerned in its preservation at a particular standard. Assuming this unhealthy condition to have existed, it would probably have been especially marked in prolonged or pernicious cases; but since, as has been shown by the records of the Seminary and other hospitals, it was precisely in such cases that petechiæ and vibices were of frequent occurrence, it may be concluded that a connection existed in typhoid between the condition of the blood and these ecchymotic appearances, although the few observations on the blood in the *post-mortem* records of the continued fever fail to show it. This view is sustained by the hemorrhagic blotches of scurvy, which are known to depend on a deterioration of the blood constituting the essence of the disease, by the ecchymoses of typhus and by the transudations which, occurring in association with a liquid and uncoagulable state of the blood, gave the name of spotted fever to those febrile cases characterized by a special impli-

action of the cerebro-spinal system. It is sustained also by the extravasations of altered blood observed in the paroxysmal fevers: and as in these there was the same want of coincidence between external and internal hemorrhagic manifestations that was found in typhoid, it follows that ecchymotic spots were probably as much due to an altered condition of the blood in the latter as in the former cases.

But although the connection between a degenerated blood and its escape from the vessels may require argument, in view of the non-coincidence of superficial and internal ecchymoses in the recorded cases of the continued fevers, it is scarcely needful to argue the existence of an abnormal condition of the blood in them. This has been shown in the malarial cases to have been the immediate consequence of the pervasion of the system by the febrile poison. Not one of the typhoid cases that have been presented demonstrates the disorganized condition of the blood as the direct result of the febrile cause; but this was observed in the following rapidly fatal case which, in this respect, was precisely analagous to the pernicious malarial cases that have been submitted. The patient died after a delirious attack of twenty-four hours, and *post-mortem* observation discovered the blood in a liquid state, the skin covered with purpuric spots, the patches of Peyer thickened and some of those near the ileo-cæcal valve remarkable for their pultaceous character, the spleen enlarged and the lungs engorged or hepatized. In this instance the disease did not last long enough for the blood to become deteriorated by gradual processes based on the imperfect operations of the organic functions. The fluidity of the blood must therefore be referred to the action of the fever-poison. The case has already been published* as 163 of the diarrhœal series. Dr. WOODWARD presented it, along with several other cases of fever that had been similarly recorded as diarrhœa, in order to illustrate a class of errors of diagnosis which were no doubt of frequent occurrence:† but as it illustrates matters of greater consequence‡ than these errors, its presentation in this connection has been deemed advisable:

Private Thomas Kelley, Co. A, 124th N. Y.; admitted Dec. 12, 1862. Diarrhœa. The patient was not confined to bed. On the 18th he was moving about and in the evening ate his supper with other patients. The same night he was slightly delirious. Died December 19, at 11 P. M. *Autopsy* next day: Body not emaciated; apparent age about 28 years; upon the body, especially the thighs, there were a number of irregular spots of purpura from the size of a flea-bite to that of a dime. The blood was very liquid and poured forth from incisions of the skin and all the internal organs. The brain was examined but exhibited no unhealthy marks. Pleuritic adhesions throughout, on both sides, of not very old date; left lung crepitant but engorged with a bloody liquid; the upper lobe of the right lung hepatized, the lower lobe congested. There was slight atheroma throughout the course of the aorta. Liver soft, Indian-red in color and large; spleen large, flabby and on section dark Indian-red, its convex surface exhibiting the remains of a former inflammation. Stomach, pancreas, kidneys and suprarenal bodies healthy. Small intestine pink in color: the agminated glands thickened and mostly bright-red in color: the lower glands were a line in thickness and contained a white cellular deposit; none of them were ulcerated. Mesenteric glands somewhat enlarged. Mucous membrane of the large intestine dirty slate-colored, with streaks of inflammation here and there.—*Act. Ass't Surg. Joseph Leidy.* [Nos. 88 to 90, Med. Sect., Army Medical Museum, from this case, are successive portions of the ileum, in each of which is a large thickened Peyer's patch: in 90 the patch is remarkable for its great size and the pultaceous character of the thickening, there are also several large solitary follicles in this specimen.]

MURCHISON§ recognizes two conditions of the blood in typhoid fever: One rare, in which it is dark-colored and liquid, the other of more frequent occurrence, in which it is disposed to coagulate in firm white coagula. He conceives that a close relation exists between the state of the blood and the symptoms during life; that when death has been preceded for some days by the typhoid state the blood is usually dark and fluid; while in other cases, as when due to perforation or pneumonia, it often contains fibrinous coagula. The first of these conclusions does not apply to the typhoid cases observed during the war; for, of those

* See Part I of this work, page 117. † Id., page 521. ‡ See *infra*, page 480. § Page 631 of his Treatise.

submitted as constituting the *post-mortem* records of the continued fevers, many presenting fibrinous heart-clots were not cut off by pneumonia or peritonitis, but died while in the typhoid state. The dark-colored and fluid condition of the blood appears rather to have been characteristic of rapidly fatal cases, such as that given in the preceding paragraph; and this observation is sustained by analogous changes found in fulminant cases of malarial, cerebro-spinal and typhus fevers.

The condition of the blood in typhoid fever has not been made the subject of special study by medical observers or physiological chemists. CHOMEL, while recognizing that the blood in this disease differed from that of pneumonia and other acute inflammations, concluded from his observations that its changes did not constitute a primitive lesion whence the symptoms of the disease were derived, nor even a secondary phenomenon.* LEHMANN states that during the first eight days of a typhoid attack the blood is like that of plethora, in which the corpuscles are increased, the fibrin normal and the albumen but little above the usual proportion; but that later it resembles the blood of anæmia, in which the corpuscles are diminished in number and the serum watery and deficient in albumen and other organic constituents although richer in salts.† VIRCHOW holds that in typhoid the fibrin is diminished; but as he states also that an increase of the colorless corpuscles may be looked for in diseased conditions attended with a notable swelling of the glands of the lymphatic system, this increase must be inferred as present in typhoid. In cases presenting a large black spleen he found pigment-cells resembling colorless blood corpuscles, spherical, often elongated and having granular contents, among which appeared black particles of various sizes; these pigmented bodies were observed also in other diseases attended with a rapid exhaustion of the vital properties of the blood and productive of cachectic and anæmic conditions.‡ ALONZO CLARK is of opinion that the most important of the lesions of typhoid fever is found in the blood; and from some experiments at Bellevue hospital he concludes that the blood-change is characterized by a progressive loss of coagulability.§

But although so few observations on the quality of the blood in typhoid fever appear in the records of medicine, the belief is generally entertained that a depraved condition is invariably present in this and other continued fevers. Sir WILLIAM JENNER deduces the existence of a deteriorated condition of the blood from the suppurations which are consecutive to the disease. He argues that the exudation of a blastema possessing the same properties in so many places at the same time, indicates the existence of a definitely diseased condition of the fluid from which that blastema is formed, just as the deposit of many masses of cancer-blastema in the same body at the same time is held to indicate the existence of a definite disease of the blood in the person who is the seat of them.‖

The degeneration of the blood, at first due to the more or less direct influence of the fever poison, becomes afterward increased and modified by the retention in the system of the products of that retrogressive metamorphosis of the tissues which appears to constitute the essential of the febrile condition, no matter what may have been its exciting cause.¶ Urea

* He drew blood from thirty patients, each of whom was in the early stage of the disease. In six the clot was firm and buffed; in twenty it was firm but not coated; in four diffluent and curdled. His conclusion, as given in the text, was based on the small number of cases in which the blood was *diffluent et caillebotté*, and the fact that a similar condition is found in diseases other than typhoid, some of which indeed are not of a serious character. From the firmness of the clot in the twenty-six cases he opposed the belief of those who held that in grave cases of fever the blood suffered a loss of coagulability.—A. F. CHOMEL, *Leçons de Clinique Médicale—Fièvre Typhoïde*, Paris, 1834, p. 50.

† C. G. LEHMANN—*Handbuch der Physiologischen Chemie*, Leipzig, 1859, pp. 230 and 232.

‡ VIRCHOW—*Cellular Pathologie*, Berlin, 1858, p. 201.

§ See *Medical Record*, New York, Vol. XIII, 1878, p. 262.

‖ *Medical Times and Gazette*, Vol. XXVII, London, 1853, p. 463.

¶ J. MILNER FOTHERGILL has a suggestive article on *The Typhoid Condition*, in the *Edinburgh Medical Journal*, 1873, Vol. XIX, Pt. 1, p. 225.

and carbonic acid are the ultimate products of this metabolism; but between these and the organized albuminous matters of the living system are a vast number of complex transition products concerning which little is known either chemically or physiologically. When the skin and kidneys are inactive, as is generally the case during the febrile continuance, these products accumulate in the blood, and coincident with this accumulation the patient falls into what is known as the typhoid condition. As urea is susceptible of quantitative determination, its retention in the blood and its pernicious influence on the system can be demonstrated. The poisonous action of carbonic acid, or of the concomitant deprivation of oxygen, as shown by the circulation of venous blood, is manifested by the insensibility and convulsions of asphyxia. Other products of tissue-waste, concerning which our knowledge is meagre, are plausibly assumed to be detrimental to the system in which they are retained. There is no proof that they are the cause of the typhoid condition; but the invariable appearance of the latter after a prolonged period of unusual change in the tissues and its more rapid development when the eliminative organs are inactive, are strongly suggestive of a causative relation between the metabolic products and the typhoid state. If this view of the occurrence of the typhoid condition be correct there is no difficulty in understanding the supervention of the so-called typhoid symptoms in malarial or other fevers* uncomplicated by the special poison of typhoid fever.

The great prostration which was characteristic of the continued fevers not only in their early stages but even from their onset, must be attributed to the condition of the blood, depraved primarily by the influence of the fever-poison and secondarily by the disorder of the functions of the body. The latter will readily be admitted as a debilitating cause. The former has been well argued by Louis as regards specific typhoid cases, in which the primary debility was more marked than in malarial cases: We cannot attribute it to the diarrhœa, as it is often present before the flux has developed, nor to the abdominal pain, which is often slight, nor to the cephalalgia, which is generally dull and which, when severe in other acute affections, is not accompanied by a like loss of strength, nor to any appreciable lesion of the brain or stomach, as shown by *post-mortem* observations; hence it is needful to recur for its explanation to the special changes in the small intestine as acting sympathetically on the brain, or still further, to the typhoid fever-poison which produced these changes.†

The intense prostration of the later stages of continued fever is the result of a complexus of causes originating in the disordered state of the blood. Prominent, however, among them is that degeneration of the muscular system which has already been mentioned in the paroxysmal and continued fevers as affecting the substance of the heart. Zenker‡ first called the attention of the profession to the frequency and extent of these changes in the muscles. He considered them wholly unconnected with inflammation; but by Waldeyer§ and Hayem‖ they were on the contrary viewed as resulting from inflammatory processes. The latter attributed them to the morbid condition of the blood, placing them among those

* See Pneumonic Fever, *infra*, page 613.

† See his *Recherches*, t. II, p. 203.

‡ Zenker—*Ueber die Veränderungen der willkürlichen muskeln im Typhusabdominalis*, Leipzig, 1864.

§ Waldeyer—*Die Veränderungen der quergestreiften Muskeln bei der Entzündung und dem Typhusprozess, etc.* Virchow's *Arch.*, t. XXXIV, 1865, p. 473.

‖ Hayem—*Etudes sur les Myosites Symptomatiques—Archives de Physiologie*, Paris, 1870. He considers (page 581) that he has established three degrees or successive phases in the progress of the muscular lesions. The first is characterized by hyperæmia, the commencement of vitreous and granular degenerations of the fibres and sometimes a slight degree of alteration of the walls of the vessels. In the second is found the complete development of the vitreous and granular degenerations of the striated contents, with a proliferation of the cellular elements in the interior of the sarcolemma, which activity sometimes extends to the vascular walls. The third degree includes on the one hand the atrophy, disorganization and complete disappearance of the degenerated fibres, and on the other the work of regeneration or reparation, involving the return of the muscles to their normal condition. The new muscular fibres formed during this last period originate in pre-existing muscular cells, the proliferation of which was evident in the second phase of the morbid changes.

disorders of nutrition that are produced in many of the tissues by diseases attended with a notable dyscrasia.

Connected with the deterioration of the blood and the degeneration of the muscles were those ecchymoses simulating contusions, and the large extravasations that were in some cases found in the voluntary muscles, particularly in the lower part of the rectus abdominis and in the muscles of the neck, as in 63, 98, 136, 157 and 248. To these causes may also be attributed the purulent infiltration of the muscles sometimes observed, as in 151, in which the sheath of the rectus abdominis was the affected locality, and in other instances noted in the analytical summary.

Scurvy has been by some considered a very important cause of the peculiar characters exhibited by the fevers that affected our troops; but this opinion is not sūstained by the records that have been preserved. In but one case, 316, was a notable scorbutic element present. If the ecchymoses, purpuric spots and hemorrhages that supervened during fever be regarded as symptoms of scurvy, this complication was of frequent occurrence; but there is no ground for supposing that these phenomena were dependent on the scorbutic taint, except in so far as it formed one of many influences which tended to their production, the determining factor being the great and sudden impress on the blood effected by the febrile poison. Certainly these extravasations occurred in cases in which, prior to the febrile attack, there was no suspicion of scurvy. They may not therefore be regarded as scorbutic symptoms when observed in the progress of fever.*

Diminished vitality resulting from disordered nutrition led to the formation of sloughs and gangrenous patches in situations determined by local conditions of impeded circulation, as on the sacrum and hips from continued pressure, in the parotid region and on blistered surfaces. Probably the absorption of morbific detritus from these gave rise to pyæmic developments in some instances, as bedsores were present in three of the cases, 125, 199 and 289, in which purulent deposits were found in other parts of the body. In some pyæmic cases, however, as in 38, which presented purulent collections in the joints and pectoralis major muscle, there is no record of the existence of bedsores or parotid abscess. Excluding these cases of purulent accumulations in the joints, there is no instance of disease of the bones following continued fever to be found among the *post-mortem* records, although the clinical accounts of severe rheumatic pain endured by convalescents render it probable that the periosteum and bones occasionally became affected, and that the large burrowing abscesses sometimes observed were associated with caries or necrosis.† A single instance of

* See *infra*, p. 622.

† Sir James Paget has observed that periostitis following typhoid fever generally affected the tibia, but occasionally the femur, ulna and parietal bones. It was always circumscribed in a space of one to three inches in area. When necrosis occurred its extent was less than that of the inflammation over it, and generally only the compact structure or outer table perished; it was never attended with the delirium, fever or other severe symptoms associated with acute necrosis. Periostitis of the ribs so resembles ordinary scrofulous periostitis that he sometimes thought it should be regarded as an evidence of scrofula educed by the feebleness of the nutrition consequent on the fever; but it has occurred after typhoid in patients of so robust and apparently unblemished constitutions that it would seem absurd to impute scrofula to them. The swelling, painful and tender, is usually on the front of the chest, and suppuration slowly occurs in it, the thin, pale pus making its exit through small openings in the skin; but he has seen pus burrow between the abdominal muscles, forming a great abscess, which had to be opened in the groin. See *St. Bartholomew's Hospital Reports*, Vol. XII, London, 1876, p. 2. Keen, page 12 of his paper cited in note, page 297, *supra*, says that of 47 cases of disease of the bones 10 arose during the first two weeks of the fever, 27 in from three to six weeks and 10 followed ten months after the fever. He attributed the earlier cases to thrombosis or embolism, and the later cases to enfeebled nutrition, whose effects, especially in structures which vary so slowly as the bones, may readily extend over such long periods. Quoting Aitken's remark that "No man can be considered fit for work or for general military service for three or four months after an attack of severe typhoid fever,"—*Holmes' System of Surgery*, 1st ed., Vol. IV, p. 50,—he gives a case in which extensive necrosis of the long bones, disabling the patient for three or four years, was the result of hard work in the use of a ten-pound hammer, undertaken before the system had sufficiently recovered from the effects of the febrile attack. He also describes a monarticular form of inflammation, a subacute synovitis, which affects the larger joints and especially the hip, where the swelling is sometimes obscured by the muscles. Usually it arises spontaneously, but occasionally from periostitis or necrosis invading the joint. It rarely produces suppurative or fistulous openings, the result being generally a gradual return to usefulness. These joint troubles are very infrequent. He cites Güterbock as responsible for the statement that in the Charité (Berlin) and in the Hamburg hospitals not a case

destruction of bone, possibly connected with fever, is furnished by the case of Carleton Bergan, private Co. B, Purnell's Maryland Legion.*

When admitted into hospital at Frederick, Md., this patient had a bedsore over the sacrum; his body was bathed in sweat and covered with sudamina; tongue dry and covered with sordes. It was reported that he had been treated in camp with large doses of mercurials, but the record does not show that he was salivated on admission. Two days afterwards a ragged ulcer was observed on the right edge of the tongue, which in ten days extended to the cheek and roof of the mouth, exposing by sloughing the entire upper maxilla. Six weeks later the whole of this bone, the vertical plate of the palate bone and a narrow strip of the left maxilla were removed, they being at the time quite separated from the healthy bone. The right eye was destroyed and sunken; the right half of the upper lip, the right ala of the nose, the adjacent portion of the cheek and the right superior maxillary bone were gone, leaving an extensive opening directly into the cavity of the mouth and right nasal fossa.†

But the most striking of the uncommon results of the disordered condition of the blood was the gangrene of the feet, recorded in six of the three hundred and eighty-nine cases constituting the *post-mortem* records. These numbers perhaps exaggerate the frequency of this occurrence, inasmuch as the unusual nature of the complication may have led to the preservation of the cases presenting it, when otherwise they might have remained unnoticed. Its uncommon character is evidenced by the fact that in one-half of the cases in which it occurred it was regarded as the result of exposure to cold.

Spontaneous gangrene, usually of parts in which the circulation is languid, is rare in the general experience of typhoid fever, but of greater frequency in typhus. In some epidemics the nose has been the site of the gangrenous attack,‡ in others the feet have suffered, as in the cases from our war records.§

occurred in a series of years, and in the Vienna General hospital from 1868 to 1871 only two cases among 3,130. MURCHISON does not mention this complication, nor any other of our text writers on surgery or practice except VOLKMANN, who gives a few lines to it in *Pitha und Billroth's Handbuch*. Sometimes the distension of the synovial cavity gives rise to conditions in which spontaneous dislocation occurs, and in a majority of the cases studied the actual dislocation was the first fact observed relative to the condition of the joint; this arose from the subacute nature of the lesion and the apathetic state of the patient.

* An account of this case is given in the First Part of the Surgical volume of this History, pp. 375–377.

† This frightful deformity was successfully treated by Dr. GURDON BUCK.—See *Transactions of the New York Medical Society*, 1864, p. 173.

‡ M. J. GUTBERLET—*Ueber die blaue Nase bei dem Typhus bellicus*—in *Hufeland's Journal*, Bd. XLII, 1816, part VI, p. 101—says that the "blue nose" was seen only in overcrowded military hospitals infected with the typhus contagion. Exposure to cold was not concerned in its production. It was met with during the hottest months of 1809 in the Austrian hospitals at Nickolsburg; during the mild damp winter of 1809–10 at Erlau in upper Hungary, and during the rigorous winter of 1813–14 in the military hospitals near Wurzburg. The patients were generally convalescents from fever who, although so far improved as to have a good appetite, did not gain in strength; they had at the same time an excited pulse, a hot dry skin, and were always tired, languid and disinclined to leave their beds even in the warmest weather. Some were soldiers with their systems completely exhausted by colliquative diarrhœa of many weeks or months continuance; these were attacked immediately on their admission. Nurses were seldom affected, even though they had by a long stay in hospital acquired the sallow, cachectic appearance or so-called "hospital complexion." The graver symptoms of nervous fever, such as delirium and stupor, never accompanied the "blue nose." The associated fever was not severe; the patient was languid, indifferent, spoke little and unwillingly, but answered questions correctly; he had mostly a frequent watery but not particularly offensive diarrhœa, and always a fixed though not very severe pain, increased by pressure in the umbilical region; he made no complaint, but his countenance was anxious and he objected to any tactile examination of his abdomen, which was sunken, retracted and had a soft doughy feel; respiration was mostly thoracic. The disease did not spread from the particular hospital, but its occurrence was regarded as a sign of the presence of a high degree of the typhus contagion. GUTBERLET saw between two and three hundred cases during the years 1809 and 1810, and subsequently during the winter of 1813–14, *all of which were fatal*. Death generally ensued in from twenty-four to thirty-six hours after the attack, but sometimes it was delayed to the third, fourth or fifth day. No *post-mortem* observations were made, but the disease was thought to be connected with a gangrenous affection of the intestine. In BARKER and CHEYNE'S *Account of the Fever lately Epidemic in Ireland*—London, 1821—Dr. BRACKEN of Waterford reports from his hospital, during the winter of 1818–19, eighteen cases in which death quickly followed a lividity which, affecting first the nose, extended in a short time over the face and ears. The fever prevailing in Ireland at this time had been preceded by excessively rigorous winters and cold damp summers. During the first of these unpropitious harvest seasons much of the grain remained uncut and was altogether lost, and a greater part of that which was saved had germinated in the husk and become in proportion impaired as an article of food. The potatoes of that year were small, wet and deficient in nutriment; turf or peat, constituting the fuel of the poor, could not be cut and dried, so that dampness of clothes and bedding, imperfect cooking of food and ventilation of apartments, deficient cleanliness of person and dwelling, co-operated with a deficiency of food in lowering the vitality of the people. "The failure of the crops in 1816 was not much felt till the spring of the following year, but scarcity then becoming general, attained its greatest height about midsummer, and extending itself to the productions of the earth occasioned extreme distress. In some places the poorer classes were compelled to the sad necessity of collecting various sea and wild vegetables, nettles, wild mustard, navew and others of the same kind to sustain life; and in places distant from Dublin wretched beings were often seen exploring the fields with the hope of obtaining a supply of this miserable food. In districts contiguous to the sea various marine plants were had recourse to for the purpose of allaying the cravings of hunger; and we have been informed that on the seacoast of Ballyshannon many of the poor during several months at this period subsisted either chiefly or altogether on cockles, muscles, limpets or even the putrefying fish they could procure on the shore. In some districts seed-potatoes were taken up from the ground and the hopes of the future year thus destroyed for the relief of present necessity, and the blood drawn from the cattle in the fields and mixed with oatmeal, when this could be procured, has not unfrequently supplied a meal to a starving family. So general was the distress and insufficient the supply in some parts of the country that a few unhappy sufferers are said to have died of absolute want of food, and many must have sunk under the combined impressions of hunger, damp, cold and the anguish of mind necessarily attendant on sad anticipations of the future."—*Op. cit.*, pp. 34–5.—The connection between these conditions and the unusual prevalence and peculiarities of the continued fevers that afterwards scourged the country was acknowledged by all the reporters.

§ Mortification of the toes and feet occurred in a few instances in the epidemic described by BARKER and CHEYNE.—See Vol. I, page 349. J. A. ESTLANDER, in an article in *Langenbeck's Archiv. für Klinische Chirurgie*, Berlin, Vol. XII, pp. 453–517—on *Gangrene of the lower extremities in Typhus Fever*—

An impoverished condition of the blood, resulting from a deficiency of food, and the other co-operating influences to which a poverty-stricken people are subject have been so generally present not only in epidemics but in individual cases of fever characterized by gangrenous tendencies, that the appearance of the latter warrants a strong belief in the pre existence of the former. The deprivations and exposures to which our soldiers were liable, together with the prostration incident to repeated attacks of antecedent diarrhœa or other lowering diseases, render it probable that in occasional febrile seizures the specific cause of the fever found the patient in a condition as favorable for the development of spontaneous gangrene as if he had undergone the preliminary course of starvation so common in Ireland during the years of famine and fever. On this view of the conditions associated with gangrene Dr. KEEN's summary of the causes may be accepted as accurate. He attributed it to an altered blood, a weakened heart and the mechanical difficulties in carrying on the circulation, especially in distant parts; but in view of the usual seat of the affection in the lower extremities he concluded that the last two causes were the more immediately determining factors.* To these, perhaps, should be added exposure to cold, as the six reported cases occurred during months when frostbite from exposure on active field service was not uncommon, although unknown amid the comparative comforts of camp and hospital life. A degree of coldness of the feet resulting from displaced blankets, which, under ordinary conditions, would have been immediately succeeded by healthy reaction, may in these devitalized cases have sufficed to determine the development of gangrenous phenomena.†

Nevertheless it is to be noted that in none of the six cases is there any record of special deprivations; on the contrary, in one, 164, the body of the patient was said to have been not emaciated. Hence it is probable that in certain cases something more than depression of the vital powers was needful to the occurrence of gangrene. MURCHISON‡ speaks of spontaneous gangrene as a result of arterial thrombosis, and ESTLANDER found the clot in many of his cases. Case 112 of our *post-mortem* records is the only instance in which the arteries are said to have been occluded.

IV.—THE BRAIN AND ITS MEMBRANES.

Cases of the continued fevers in which the condition of the brain and its membranes was examined constitute but a small percentage of the whole number. In some of the hospitals where *post-mortem* investigations were systematically pursued the brain was examined

based upon observations made during an epidemic which prevailed in Finnland during the famine of 1866–68, states that the affection was no doubt due to the intensity of the typhus contagion, aggravated by a want of food and proper care during the disease. With regard to its immediate cause it is said that of twenty-one cases met with there were thrombi in the principal artery of the limb in fourteen; and it is held that these were plainly the cause of the gangrene, as their presence was established by examination of the artery during life and after death. Generally no pulsation could be felt in the vessel of the affected limb, while that of the vessel of the opposite side could be readily detected. The obstructed artery felt like a hard cord and was wholly without sensation. Now and then, below the knee, it would feel harder and more resisting than usual, and in the vicinity of Poupart's ligament would still pulsate feebly and obscurely, yet so evidently as to render it uncertain whether any obstruction actually existed; but on amputation the hemorrhage was trifling,—no blood came from the femoral or popliteal, and only a little from the smaller muscular branches, while a fibrinous plug filled the vessel and projected beyond its retracted end. Most of the thrombi were examined; they generally terminated below where an abrupt narrowing occurred, as at the division of the popliteal artery, or as was the case in one instance, at the origin of the profunda femoris, from which the thrombus extended upward. In one case in which the part removed by amputation was not wholly disorganized and a plug was formed at the bifurcation of the popliteal, the vessels below this point were completely free and sound; in another case in which amputation had been performed at the upper third of the leg, the anterior and posterior tibial and the peroneal arteries were found empty. ESTLANDER was of opinion that when the obstructing coagulum did not extend from the popliteal artery higher than the tendon of the adductor magnus gangrene either did not result or involved only a toe or a small portion of the foot; but when it extended beyond the origin of the profunda femoris the disease involved the upper third of the leg; this was illustrated in eight or ten cases. The emboli were believed to have originated in the left ventricle of the heart when, owing to debility, contraction was imperfect and evacuation incomplete. Afterwards, when the heart became stronger, the coagula were expelled and occluded the vessels. This gangrene from obstruction was observed only at the end of the fever or after the commencement of convalescence. Gangrene, where no obstruction was found, showed itself by peculiar symptoms even at the beginning of the fever and attacked both sides, being confined generally to some of the toes or to other small portions of the foot and only in the severest cases extending as far as the ankle-joint.

* See page 35 of his *Lecture*, cited *supra*, note to page 297.

† See report of Surg. J. H. TAYLOR, U. S. V., *supra*, p. 310.

‡ Page 559 of his *Treatise*.

as a matter of course, but in others where apparently the object of the examination was merely to verify a diagnosis or find an adequate cause for death, the intracranial examination was frequently omitted unless specially called for by clinical manifestations. Hence it may be assumed that the cases in which time was devoted to opening the calvaria and examining its contents were as a whole characterized by a prominence of the cerebral symptoms. Nevertheless, in a large proportion of these no abnormal appearance was observed. The brain and its membranes were considered normal in 45.5 per cent. of the purely typhoid cases; congestion and effusion were present, but none of the cases presented undeniable evidence of the existence of inflammatory action. Of the malarial cases in which the cranium was opened abnormal appearances were observed in 64.7 per cent. The hyperæmic tendency attained a higher development in these cases than in typhoid; and this was shown as well by the intensity of its manifestions as by their frequency, for in one case, 287, the cerebrum was ecchymosed, and in two, 80 and 257, the active character of the hyperæmia was evidenced by the lymph that had been exuded. Morbid changes were found in 54 per cent. of the typho-malarial cases and in 41.2 per cent. of the mixed series of cases.

In a large number of cases in which the brain and its membranes were said to have presented a healthy appearance nothing is known of the associated symptoms; in certain other of these cases, as 23, 36, 106, 112, 116, 289 and 380, no mention was made of head symptoms, although what must be regarded as the clinical characteristics of each case were stated by way of preface to the *post-mortem* record. There remain, however, some important observations which show that very notable disturbances of the cerebral functions occurred without leaving in the brain or its membranes any trace by which their existence could have been predicated. Thus, in 7, 24, 29 and 199 delirium was present, prolonged in the last-mentioned case for a week before death; in 370 the patient was deaf and unconscious; in 368 he fell into a lethargic state twenty-four hours before death; and in 56 coma and delirium were reported, apparently in connection with inflammation of the middle ear.

Looking now at the cases in which some abnormity was discovered in the brain or its membranes, it is found that in many of these no record of the associated symptoms has been preserved, while in others, as 42, 80, 99, 264 and 276, although certain symptoms were reported, no mention was made of any referable to the encephalic lesions. Delirium was mentioned in ten cases, 8, 109, 111, 117, 247, 278, 281, 287, 291 and 297, as the prominent cerebral symptom. Generally it occurred as the precursor of death, supervening, as in 287, a few hours before the fatal issue, or lasting, as in 278, for several days with occasional lucid intervals. This was associated in the majority of these instances with congestion of the pia mater, leading in case 287 to ecchymosis, with or without congestion of the cerebral substance or effused serum in the subarachnoid space and ventricles. In one case, 111, in which delirium was associated with insomnia, the arachnoid at the base of the brain was thickened and opaque and the ventricles filled with effused liquid. But in contrast with these hyperæmic appearances the brain and its membranes in 109 were pale and anæmic, and in 291, in which delirium lasted for several days, the brain was normal and the pia mater anæmic, opaque and wrinkled.

In nine cases, 9, 26, 45, 47, 86, 104, 257, 303 and 304, the cerebral implication was marked by unconsciousness, usually succeeding to delirium or insomnia, and passing into death by coma: In 45 and 47 the only abnormal appearance consisted of a serous transudation into the arachnoidal sac or ventricles, and in 26 and 104 of a simple injection of

the membranes, while in 9 and 86 both injection and effusion were said to have been present. In 304 the condition of the membranes was not stated, but the cerebral substance was firm and slightly congested posteriorly. In two cases only, 257 and 303, were definite signs of inflammatory action presented—a coating of lymph on the base of the brain and a turbidity of the ventricular serosity.

In two cases, 343 and 349, the encephalic symptoms were said to have been those of meningitis, but the prominent *post-mortem* lesion in each case consisted of subarachnoid effusion. In 299 signs of cerebral congestion, noted clinically, were verified by *post-mortem* examination. In 160, in which the cerebral disturbance was manifested by craziness, the usual hyperæmia of the membranes and subarachnoid effusion were observed. Lastly, in 379, in which death overtook the patient suddenly and quietly while in bed and supposed to have been asleep, the brain and its membranes were engorged with bright blood and the ventricles distended with sero-sanguinolent serum.

Although headache, dizziness, insomnia, delirium, dulness, stupor and coma were in some instances associated with changes in the brain and its membranes, to which they might with propriety be attributed, the encephalic lesions were in other cases wholly incommensurate with the intensity of the cerebral symptoms; and in many cases noted the latter were, indeed, unaccompanied by any observed lesion. Louis long ago demonstrated that the existence of delirium in typhoid could not be in all cases explained by the condition of the brain. He argued also that the intestinal lesion could not be regarded as the cause of the delirium, for although there is delirium in pneumonia there is no concomitant intestinal lesion, and it is unlikely that the sympathetic action on the brain of organs so different in function and structure as the lungs and alimentary canal should be similar.* He attributed the delirium to the pyrexia, as it was the only pathological factor common to all the cases. It has already been shown, in speaking of the alteration of the blood resulting from the persistence of fever, that the febrile condition may develop delirium by an accumulation in the blood of the noxious transition products of tissue-waste. The coma that was the frequent prelude of death may also have been due in many cases to this altered blood, for free effusions were often discovered in the serous and subserous spaces without a concomitant congestion. Effusions unconnected with inflammatory processes were observed in other serous cavities, particularly in the pericardium, and these must be referred to that watery condition of the blood which occasioned œdema of the legs in the paroxysmal fevers and in some, as 70 of the malarial series, of the continued fevers.

But cerebral symptoms unconnected with notable hyperæmic conditions of the brain or its membranes were not in all cases due to that alteration of the blood which resulted from the continuance of the fever, for in some instances they were developed from the beginning of the attack.† The patient in the case presented on page 473, *supra*, died after an illness of twenty four hours marked by slight delirium; and while the brain exhibited no unhealthy appearances the blood was so liquid that it had become extravasated subcutaneously in irregular purpuric spots and issued freely from *post-mortem* incisions into the skin and internal organs. Here the disordered condition of the blood was evidently a primary lesion manifested by cerebral phenomena.

* Louis,—*Recherches, &c.*, t. II, p. 176.

† Speaking of delirium in typhoid, Bartlett, in his *Treatise on the Fevers of the United States*, Philadelphia, 1852, p. 65, says: "In a small number of cases this symptom is present at the commencement or very early in the disease. * * * As a general rule, it appears early in proportion to the gravity and rapid progress of the disease." Murchison gives two cases, one of which was fatal on the first and the other on the second day. "The symptoms in these rapid cases are usually severe headache and acute delirium, with profuse diarrhœa or great engorgement of the lungs."—*The Continued Fevers of Great Britain*, London, 1873, p. 548.

V.—AGE OF PATIENT, STATE OF NUTRITION, ETC.

In addition to the anatomical changes in the various organs the *post-mortem* records frequently make note of two points which may be briefly referred to at the present time—one the age of the subject, the other the nutrition of the body.

The AGE is stated in thirty-seven of the fifty typhoid cases; the minimum, 15 years, in case 30, the maximum, 53, in case 47, and the average 24.7 years. Of the sixty-three malarial cases the age is given in forty-one; the minimum, 16 years, in case 364, the maximum, 63 years, in 73, and the average 25.8 years. In thirty-eight of the sixty-one cases of true typho-malarial fever the average was 24.8 years; the minimum, 16 years, in cases 266 and 298, and the maximum, 53, in case 96. The age is given also in one hundred and twenty-six of the two hundred and thirteen cases of the mixed series; the minimum, 16 years, in 299, 348, 359 and 372, the maximum, 55, in 334, and the average 27 years. While these figures show that the average age of the victims of continued fever of malarial origin was greater than that of the typhoid subjects, it is evident that the observations are not sufficiently numerous to offset the influence of the intrusion of a few cases of an exceptional character in this regard.

If the cases constituting the clinical records of the continued fevers be incorporated with those presented as *post-mortem* records, it will be found that four hundred and thirty-one cases have been submitted in which the age of the patient is stated. These, tabulated on the following page, indicate that the especial victims of the continued fevers were soldiers from eighteen to twenty-four years of age; but inasmuch as it may be said that this merely expresses the preponderance of men of these ages in the army, two columns have been added showing the relative frequency of fever among men of certain ages as compared with the ratio of their numbers to men of all ages in the army.* From these it will be seen that soldiers under twenty, and particularly soldiers from twenty to twenty-four years of age, suffered much more from these fevers, in proportion to their number in the ranks, than men of more mature age. Men between twenty and twenty-four years of age constituted only 28.03 per cent. of the army, but they furnished 38.98 per cent. of the cases which form the basis of this calculation. On the other hand, the number of cases in men over twenty-five years was less than it would have been had they been affected in proportion to their number in the ranks.

* It is impossible to obtain an accurate expression of the relative numbers of men of various ages in the army during the war. The percentages given in the table have been derived from data gathered from the second volume of Dr. J. H. BAXTER'S *Statistics, Medical and Anthropological, of the Provost Marshal General's Bureau, Washington, D. C.*, 1875. Table XIX, covering pages 461–465 of the volume cited, embraces the statistical results of the examination of 334,321 recruits, substitutes, drafted and enrolled men of various nationalities. From these statistics were obtained the following figures, which give the relative number of men of the ages stated, based on an examination of 211,705 men accepted for military duty:

Age.	Number of men examined.	Number rejected for special causes.	Number accepted for military duty.	Ratio of accepted men of stated ages per 100 of the total accepted.
Under 20	58,952	15,815	43,137	20.38
20–24	78,639	19,305	59,334	28.03
25–29	[illegible]	18,721	[illegible]	[illegible]
30–34	45,777	18,833	26,944	12.73
35–39	50,456	23,349	27,107	12.80
40 and over	43,786	26,593	17,193	8.12
Total	[illegible]	122,616	211,705	[illegible]

Table LI.

Showing the ages of four hundred and thirty-one cases of Continued Fever, and comparing the frequency of these fevers at certain ages with the relative number of men of those ages in the ranks of the Army.

Age of patients.	Number of cases.	Number of cases of the ages bracketed.	Ratio of cases of the ages bracketed per 100 cases of continued fever.	Ratio of men of the ages bracketed per 100 men of all ages in the Army.
15	1			
16	9			
17	9	101	23.43	20.38
18	42			
19	40			
20	31			
21	36			
22	36	168	38.98	28.03
23	38			
24	27			
25	18			
26	18			
27	10	69	16.01	17.94+
28	13			
29	10			
30	16			
31	4			
32	7	42	9.75	12.73
33	9			
34	6			
35	9			
36	6			
37	5	27	6.26	12.80+
38	5			
39	2			
40–45	14			
46–53	7	24	5.57	8.12+
54–63	3			

Inasmuch as malarial fever is well known to affect men of all ages, this susceptibility of the younger soldiers to attacks of continued fever must be attributed to the influence of the typhoid element, the more so as statistics from civil and military life are alike unanimous in indicating a greater relative prevalence of enteric fever in young than in old persons.* The mean age of the four hundred and thirty-one tabulated cases was 25.06 years.

* The early writers on typhoid fever, as distinct from typhus, were inclined to regard the age of the patient as an element in the formation of a diagnosis. Chomel and Louis, in 1839, declared that they had never observed the disease in subjects under fifteen nor over thirty years of age; but Chomel himself had occasion to report at a later date five cases in which the patients were over the latter age. At first many cases of typhoid in persons over forty years were regarded with doubt as possible cases of typhus; but in progress of time instances were reported which could not be set aside in this way, and ultimately hospital statistics settled the point, showing that age conferred no immunity from enteric attacks. Murchison, page 439 of his *Treatise*, gives a table of the number of typhoid cases admitted into the London Fever hospital in each given period of life during the twenty-three years 1848–70, the total of admissions being 5,911, from which it appears that 56.70 per cent. of the cases were from fifteen to twenty-nine years of age, 4.54 per cent. over forty-five years, 1.37 per cent. over fifty years and .44 per cent. over sixty years of age. Liebermeister states, in his article on typhoid fever in *Ziemssen's Cyclopedia*, that of the patients received into the hospital at Basle during the period 1865–70, 58 per cent. were between the ages of twenty-one and thirty years, 7.12 per cent. over forty years, 2.12 per cent. over fifty years and 0.12 per cent. over sixty years. Léon Colin—p. 63, *De la Fièvre Typhoïde dans l'armée*, Paris, 1878—gives a table from the *Medical Statistics of the Civil Hospitals of Paris* for the years 1861–64, which shows the special incidence of the disease on persons between twenty-one and thirty years of age. He says that it is among soldiers of twenty-two years of age that typhoid fever selects the greater number of its victims.

THE CONDITION OF THE BODY.—The body was generally represented as greatly emaciated, a result of defective assimilation and increased tissue-waste during the continuance of the febrile movement. Naturally, however, there were exceptions in this regard. On the one hand, in rapidly fatal cases, death occurred before the loss of tissue became particularly marked; on the other hand, death arising from some accident during convalescence might leave the body in a fairly nourished condition. Again, when the fatal result was due to the sudden or early development of some secondary lesion, as occlusion of the rima glottidis, pneumonic congestion, perforation of the intestinal walls or hemorrhage from an eroded vessel, the subject was frequently said to have been but little emaciated. These exceptional cases were more common in the malarial than in the typhoid series.

VI.—GENERAL CONCLUSIONS.

In a large majority of the cases it is impossible to learn from the records what may have been the immediate cause of death or the anatomical factor in determining the fatal result. The patient was prostrated by the circulation of an altered blood; and after death the intestines were found congested or ulcerated, and the liver, spleen, kidneys, lungs, heart and brain more or less altered from the normal, but none of them presented lesions which of themselves sufficed to account for the fatal ending. Frequently death in these cases was considered due to asthenia, failure of the heart's action being manifest in the symptoms; in others coma was the harbinger of death. Among the former an exhausting diarrhœa or hemorrhage was often credited with the result; among the latter were found instances in which the condition of the brain failed to account for the fatal issue. In all these cases the primary influence of the fever-poison on the blood must be regarded as having been the specially dangerous element. The probability that the formation of heart-clot was the immediate cause of death in many such cases has already been argued.

But there were certain cases in which the *post-mortem* appearances concurred with the symptoms during the closing hours of life in indicating that death was due to a particular cause. Thus, in forty-three cases the intestine was perforated, in one the walls of the gall-bladder were destroyed, and in sixteen there was peritonitis apparently independent of perforation. The lungs were more or less congested in 68.3 per cent. of the cases, but in a large number of these the lesion was manifestly insufficient of itself to account for the fatal result. Nevertheless in some, which may readily be selected from the records, it is evident that the congested or hepatized condition of these organs was inconsistent with the continuance of life, and was accordingly the special factor that determined the issue. In this connection congestive conditions of the larynx, including the formation of diphtheritic membranes, have already been instanced. In other cases death may be referred with more or less probability to gangrene of the intestines, of the feet or of blistered and erysipelatous surfaces, as also to parotid abcesses and purulent accumulations in other parts of the body, while occasionally it was the result of accident, as in the instance of suffocation by the intrusion of a lumbricoid worm into the air passages, case 378, or, as seen in the clinical records, by the unwitting suicide of the delirious patient, case 41.

In reviewing the symptoms of the continued fevers during the war certain differences were found between the typhoid fever of our camps and the disease as known to the literature of medicine. Certain differences were also observed between our typhoid cases and those in which the typhoid was associated with a malarial element; and these differences attained

their maximum when continued fevers of a purely malarial origin were subjected to comparison with those that were regarded as unmodified typhoid. So, in the examination just concluded of the *post-mortem* appearances of these cases, certain differences are discoverable between our camp typhoid and that of civil life, and between the former and the continued malarial fever with which it was so frequently associated.

The typhoid of our camps was distinguished clinically from the typhoid of civil experience by signs which indicated a higher degree of deterioration of the blood. In many cases this deterioration was equivalent to a greater intensity of the typhoid fever-poison, for it has already been seen that a depraved condition of the blood was a primary result of the action of the poison and a secondary consequence of the increased tissue-waste characterizing the febrile condition. This virulence of the typhoid influence was indicated by greater prostration, delirium of a lower type, the occurrence of hemorrhagic blotches, the frequency of purulent infiltrations and the increased fatality of the disease. *Post-mortem* observations make note of the blotches and infiltrations; but as the records do not recognize any special differences, other than these, in the organs of the body as compared with their appearance in ordinary typhoid, the increased fatality must be referred to that alteration of the blood which was the probable cause of the purpuric spots and purulent collections.

Our typhoid fever was distinguished clinically from fevers of malarial origin associated with it by the presence in the latter of symptoms indicating a more frequent or more intense implication of the stomach and upper part of the intestinal tract and of the large intestine. A greater gravity of the cerebral symptoms and of those referable to the liver, and a greater fatality of the disease also attended the cases in which a malarial element was associated with the operations of the typhoid poison. Correspondingly the *post-mortem* records disclose an increased frequency and intensity of the congestive changes in the stomach and duodenum, a more diffuse congestion of the ileum and a more frequent affection of the large intestine, particularly of its solitary glands. A greater frequency and intensity of the hyperæmic conditions of the liver and brain and a somewhat lessened frequency but greater intensity of the morbid changes in the lungs and spleen are also observed. The malarial cases were in fact characterized by the intensity and extent of their congestions. The greater fatality of the typho-malarial cases was largely due to these local conditions of the brain, lungs and intestinal canal; but it must also be in part ascribed to that altered condition of the blood which constituted the primary lesion of the paroxysmal fevers. In association with the similar abnormal changes that occurred in typhoid the primary impairment of the blood was of necessity greater. Thus may be understood the increased prevalence of hemorrhages, suppurations and gangrene in protracted cases, and the more rapid course of those cases that occasionally suggested to our medical officers the presence of the typhus poison.

It is believed that the *typhoid* cases presented in the previous sections of this chapter are such as would have been submitted under this title by Dr. WOODWARD had he been spared to conclude this work. Those which he would have presented, so far as can be gathered from his remarks at the International Medical Congress at Philadelphia, Pa., in 1876, as illustrations of *typho-malarial fever with the malarial element predominant*, have been here reported as continued fevers of malarial origin; for the study prosecuted in the progress of their preparation for publication has not only failed to show in them the presence of a typhoid element, but has assimilated them to the fevers due to a purely malarial cause notwithstanding their so-called typhoid symptoms. Those that have been described in the foregoing

pages as truly typho-malarial in Dr. WOODWARD's acceptation of the term, constitute the class to which he would have applied the title *typho-malarial with the typhoid element evidently predominant*. His *scorbutic class* of cases has formed no separate series in the presentation here given, for in but few of the cases were the symptoms of a scorbutic complication prominently marked. Scurvy, as will be seen hereafter, was one of many causes which occasionally co-operated to render the typhoid of our camps different from that of civil life, and to increase the gravity of our malarial and typho-malarial cases. Being essentially a deterioration of the blood it could not fail to aggravate diseases that owed not only their primary danger but many of their serious secondary evils to a depraved condition of that fluid: but unless under this title be gathered all the many causes that tended to deteriorate the blood of our soldiers on its formative aspect, to it alone may not be ascribed the whole of the increased gravity that characterized our continued fevers.

VI.—ETIOLOGY OF THE CONTINUED FEVERS.

I.—COMMON CONTINUED FEVER.

The symptoms characterizing this fever, as reported during the first fourteen months of the war, were those which at a later date were generally accepted as indicating the probable presence of the typhoid poison. But a fever ushered in by chills or malaise, with headache, dizziness, ringing in the ears, epistaxis and light delirium, and running a variable course of from one to many days, presents nothing specific in its aspect. Even had this febrile condition been associated with diarrhœa and more or less abdominal tenderness, a diagnosis of typhoid would hardly have been warranted, in view of the great prevalence of diarrhœal affections among the troops.

Our soldiers were exposed to a variety of depressing influences, and especially to overheating by violent exertion, to subsequent chill, continued exposures in the hot sun, cold, dampness and foul air from overcrowding in closely shut tents and huts and from decomposing substances on or near their camping grounds, each of which has been shown by experience to be capable of inducing a condition of marked febrile reaction, ephemeral in character under favorable hygienic surroundings, but persisting for a longer period under continued or recurring exposure to the exciting cause.* These fevers, unaccompanied by local inflammations, may be considered to have been the result of a temporary deterioration of the blood, which in some unfavorably situated cases reduced the patient to the adynamic condition so generally associated with typhoid fever. But clinically they differed from enteric fever, and etiologically they have not been proved to be identical.† It is therefore a subject of

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* Surgeon MEDORA C. DORR, in an article *on the Endemic Continued Fevers of subtropical latitudes,—British Med. Jour.*, Vol. II, 1880, p. 738,—observes that in the subtropics that cases of continued fever constantly occur which have not only no constant specific complication but sometimes very few local symptoms.

† Surgeon [illegible], U. S. A., 321 Ill., in an article giving his views on the nature and origin of *Camp Typhoid Fever,—Chicago Medical Examiner*, Vol. X, 1869, p. 81,—refers the disease to non-specific influences, such as have been indicated in the text, as the cause of common continued fever. He believes that the fever is caused by mal-nutrition and depravation of the blood, attributing the defective nutrition to derangement of the digestive [illegible] of the circulation with impurities to torpor of the excretory organs, the skin, kidneys and liver. Both of these abnormal conditions are consequences of deficient nerve-force induced by various influences operating on the nervous system, as excessive and long-continued [illegible], rendered more exhausting by depressing mental causes, as constant fear or anxiety, the cheerlessness and monotony [illegible] of home joys, of the society of friends, of accustomed amusements, in short, of all those things which in the previous lives of [illegible] happy state of mind. He allows that the influence of such causes may not be readily apparent in every case of this fever, but [illegible] evident existence of a disturbance of the cerebral functions. He regards the disease of Peyer's glands as [illegible] incidental and due to the acrid and irritating secretions resulting from impaired digestion.

regret that they were deprived of an appropriate title on the Monthly Reports of Sick and Wounded. By their separation from recognized febrile conditions some information might have been gathered concerning their causation and kinship.

II.—TYPHOID FEVER.

There are few papers on file relating to the causation of typhoid fever, although many incidental references were made in general reports to the hard service of the men, the inclemency of the weather and insanitary conditions in camp as connected with the prevalence of this fever. In the extracts which are submitted below FARLEY attributes the disease to hard service and its incidental exposures, BACHE to the unaccustomed mode of life of the young soldiers, WARREN chiefly to a pythogenic miasm, LYMAN to overcrowding and bad ventilation and JAMISON to hardships and exposures, although he also suggests a transmission of the disease from the localities whence the men were recruited. Dr. SANFORD B. HUNT* states that the first case of typhoid fever in his regiment occurred at Baltimore, Md., while the command was en route southward from New York. During the illness of this patient "two or three of his family in the healthiest part of Tioga county died of typhoid; of course my man brought the fever from home with him."

Surgeon JAS. M. FARLEY, *84th N. Y., June* 30, 1862.—The regiment has marched during the quarter 345 miles, occupying nineteen days, being an average of eighteen miles per day. All the camps were finely located except the one at Bristol, which was in a swamp, and during three days of the time we were there it rained incessantly. This caused a large number of cases of a low grade of remittent fever and some of typhoid.

Brigade Surg. T. H. BACHE, *Hatteras Inlet, N. C., Dec.* 31, 1861.—The ground in many places occupied by our troops during the first part of the quarter was a sandy waste, a portion of which the water is continually asserting its right to hold. A mile above Fort Hatteras we have Fort Clark, where there is a little marsh grass; a few small scrub-oaks were there formerly, but I learn the rebels cut them down when they occupied the place. Half a mile above Fort Clark the island becoming broader, we have a tract of ground covered with a scanty vegetation, intersected by marshes producing a very coarse grass which yields a poor support to some very diminutive cattle. This condition of country continues for about four miles up the coast, when suddenly we come to a narrow part of the island where there is no vegetation. Here we find a sandy plain called Bald Beach. In barracks just below, but bordering on Bald Beach, the greater part of the command is now located. From this description one can readily understand why the chief diseases are intermittent and remittent fevers. These fevers are only to be dreaded during the spring and autumn. The typhoid (enteric) fever cases we should have expected in regiments containing young men who are living a life so different from that formerly passed by them. Many are too thoughtless to take proper care of their health, and unfortunately, they frequently have company officers over them who are ignorant of the rules to be enforced for protecting their men, or, if told, do not understand the importance of such measures. The regiment would be much less sickly if company officers insisted upon personal cleanliness, proper ventilation of quarters and thorough cooking of the government rations. The last we have found both ample and of excellent quality.

Brigade Surg. J. H. WARREN, *Washington, D. C., Nov.* 26, 1861.—Having inspected the various camps at Meridian Hill, Kalorama, &c., near Washington, D. C., I have the honor to report that the 52d Pa. has more cases of sickness than any other regiment visited. The prevalent disease in this command is typhoid fever, of which there are thirty-five or forty cases. The cause is conceived to be the malarial location of the camp. The soil is a heavy, cold clay, incapable of allowing the water to filter through it; and consequently the ground is very cold and damp. Near the camp is a deep ravine containing mineral springs (magnesia, I believe). These, with the vacillating temperature of the present season and the obstruction of drains with decomposing waste, such as coffee-grounds, beans, bread, old bones and slops from the mess-pans, are the principal agents which conduce to the large amount of febrile disease in this regiment.

Report on the condition of the 77th N. Y., by J. H. WARREN, *Brigade Surgeon, Washington, Jan.* 27, 1862.—This regiment is encamped upon the western slope of Meridian Hill. The ground is as good for camping, owing to its gravelly and porous nature, as any in the vicinity; but the atmosphere is impregnated with a malarial odor, arising from the decomposition of animal matters just below in an open field, where a large number of dead horses are deposited upon the surface and allowed to remain and decompose. This, with rather poor policing of the camp, has given rise to typhoid fever, from which, I regret to say, we have lost some ten or twelve men already.

Medical Inspector GEORGE H. LYMAN, *U. S. A., on the sanitary condition of Fort Wood, New York Harbor, Feb.* 18, 1865.—The command numbers 1,175: The permanent garrison 448, recruits, stragglers and deserters 122, and convalescents just discharged from various hospitals and awaiting transportation to the front 605. The barracks are unfit

* *Buffalo Med. and Surg. Journal*, Vol. II, 1862, p. 292.

for use: their occupancy is calculated to send the men soon back to hospital. The floors rest on the ground: the ceilings are low and the light insufficient. At this time many men are obliged to sleep on the floor, and I am told that rooms which ought not to contain over 50 men (though with bunks for 80) often have 120 occupants. Forty-five of those now in hospital are from the convalescents; and the cases are almost exclusively of a low type—typhoid fever, pneumonia, erysipelas, &c.; of the last-mentioned disease there were six cases in January and seven this month.

Surgeon JNO. S. JAMISON, *86th N. Y., Good Hope, D. C., Dec.* 31, 1861.—Our present camp is situated on the border of an open wood land, timbered with oak and chestnut, upon a rise of ground facing south, sides sloping east and west, with a small stream of clear pure water at the foot of each declivity. This location is free from mud, the soil drying off rapidly after each rain-storm. It would become objectionable, however, later in the season, when the temperature is sufficiently high to favor the rise of malaria from the decaying vegetable mould upon its surface. Typhoid fever and pneumonia have prevailed to a considerable extent during the months of February and March, the former having caused fourteen and the latter five deaths in the regimental hospital. The whole number of deaths from fever in the regimental and general hospitals will not, probably, exceed twenty-five. The tendency to this fever in camp at present gives cheering evidences of an abatement in prevalence and severity. I can mention no causes beyond those ordinarily referred to where many men are crowded together and exposed to the vicissitudes of weather common to this region of country. The long and weary march of sixteen miles through mud and rain to Camp Griffin, Va., the stay of the regiment there for a month exposed to constant storm, the sun rarely making its appearance, and the march back to this locality may with propriety be referred to as strongly exciting causes of sickness amongst our men. Predisposition to this fever may have been laid before the men left the vicinity of their homes, where the disease in question has prevailed to a considerable extent during the fall and winter. Certainly a wide difference in climatic influence must be felt by the men who have wintered in this climate, so different from that of the rugged hills and frozen winters of Western New York. The troops are daily employed in the ordinary military exercises of the field. The habits of the men are fairly good, bathing once or twice weekly, changing underclothing weekly, ventilation and cleanliness of tents observed and streets well policed.

A report by Ass't Surgeon MILHAU, U. S. Army, contrasts the condition of the 11th and 14th U. S. Infantry, stationed at Perryville, Md., in the early period of the war. The former regiment was healthy, the latter scourged with typhoid fever. Dr. MILHAU referred the disease to the bad quality of the water used by the men of the 14th and to stable manure in the vicinity, although so far as concerns the latter the teamsters, who were more exposed to its odors, were unaffected. From what has been already advanced concerning the prevalence of typhoid fever among new levies, it seems as if in this instance the explanation must lie in the character of the living material constituting the two commands, although both were new and untried regiments, organized and recruited during the previous summer and autumn.

The quarters of the 14th U. S. Infantry were shortly afterwards occupied by the 10th N. Y. Cavalry. The regimental surgeon, R. W. PEASE, on inspecting the camp of the 11th Infantry and that assigned to his own command, attributed the insalubrity of the latter to defective drainage and a more recent turning up of the soil for agricultural purposes. Measures were taken to remedy these objectionable features, but in a few days diarrhœa and intermittents became prevalent, and in three weeks many cases of remittent fever were developed, two of which assumed a typhoid type. At this period the regiment was removed to Havre de Grace, Md. It does not appear, however, that the typhoid symptoms developed in these cases were due to enteric fever: for although the special report fails to follow up the history of the regiment, the Monthly Report of Sick and Wounded for the following month, April, shows twenty-eight cases of remittent fever and only one reported as typhoid, all of which ended favorably.

Ass't Surgeon WOODHULL, U. S. Army, testifies to the absence of typhoid fever from the ranks of the two old regiments, the 2d and 10th U. S. Infantry, with which he served, attributing their freedom to the more seasoned condition of the men as compared with the susceptible material of newly-organized commands.

Ass't Surg. J. J. MILHAU, *U. S. A., on the sanitary condition of troops stationed at Perryville, Md., Feb.* 10, 1862. *Eleventh U. S. Infantry.—Hospital* in a one-story stone house containing two rooms and a garret: the rooms 18 × 18 feet; only one used as a ward. An addition of boards serves as a dispensary and kitchen and a further extension as

a sick ward for teamsters. The building, which is heated by a stove, will answer as long as the number of sick is small. A few of the patients sleep in the garret on bunks and sacks. Sick in hospital 10, in quarters 16—total 26; none in general hospital. Strength of regiment 340.

Diseases.—There are no serious cases; no typhoid or other fevers.

The *barracks* consist of four board huts each accommodating one company, and each 85 × 18 × 7½ feet to plate; no ceiling; ventilators in centre of roof; windows on one side only; bunks double and in two tiers, each with a bed-sack. There is an addition to each set of quarters for a kitchen and mess-room. The houses are a little raised from the ground; the soil is a pretty dry sod. *Police* very good. *Clothing* ample; men neat. *Messing* good.

Water is obtained from a small spring.

Sinks built over the river and well attended to.

Fourteenth U. S. Infantry.—Hospital in two unceiled board huts: one 72 × 14 × 7½ feet to plate, with dispensary 14 × 14 attached; the other 40 × 14, same height. These huts are pretty well located, raised from the ground and furnished with full windows on each side and two ventilators in the roof; they are heated by stoves. In the large ward are twenty-six wooden bunks, in the smaller ward fifteen iron bedsteads. Sick in hospital 41, in quarters 96; total 137. Strength of regiment 850. Ten new cases were taken sick this morning.

Diseases.—In hospital: Typhoid 20, measles 7, mumps 4, diarrhœa and convalescents 8, erysipelas 1 and injury 1. In quarters: Many cases of diarrhœa, catarrh and fever.

Barracks.—Board huts enclosing a quadrangular space or parade ground, into which the windows and doors open; there are no openings on the outer walls. The ground is an old ploughed field nearly level, the soil clay. The huts are raised from one to three feet, according to the undulations of the surface; in their front a rough stone walk has been laid and a ditch dug to carry off the water. Each set of quarters is 80 × 18 × 7½ feet to the plate; no ceilings; half windows on one side only; two ventilators in the roof; heated by stoves; two tiers of double bunks, each with a bedsack. Each company has a kitchen under the same roof. *Police* good. *Clothing* ample. *Messing* good.

Water is drawn from a well six feet deep; it is cloudy and has a strong vegetable taste.

Sinks over the river.

The *sanitary condition* of the regiment has not been good for some weeks owing to the prevalence of typhoid fever. The disease commences with severe vomiting and purging of a colorless fluid, which continues one or two days, greatly prostrating the patients; chills ensue, followed by continued fever, the tongue becoming dry, with red edges, and the other symptoms of typhoid soon show themselves. There have been a number of deaths from this disease and from measles. I carefully inspected every part of the barracks, the provisions, etc., and failed to find any satisfactory cause of disease except in the water used by the regiment, which I consider bad. I understand that the inhabitants do not generally use the well-water during the winter, but the river-water, which is said to be healthier. There is an extensive mule-yard and stable adjoining the barracks on one side, though there are neither doors nor windows opening on that side. A good deal of filth had accumulated in this yard, but when the troops commenced to fall sick it was cleaned out and much of its manure removed. There may be something in the soil which so far has escaped detection; but there are over two thousand teamsters camped in the vicinity and there is little or no sickness among them.

I recommend the well to be closed up and the river-water only to be used. I also recommend quinine-whiskey to be given to the men to counteract what I suppose to be a malarial influence. If the disease be not checked in a few days the regiment should be moved.

Surgeon R. W. PEASE, *10th N. Y. Cav., Havre de Grace, Md., March* 31, 1862.—About the first of March orders were received to move to Perryville, Md., and occupy the quarters of the 14th U. S. Infantry. On the 7th we entered these quarters, and while we found them commodious and in good condition, we learned that the regiment which had just left had suffered severely from typhoid fever and diseases of a like character. The barracks are situated on the eastern shore of Chesapeake bay, an elevated and pleasant situation. About 400 yards distant were the quarters of the 11th U. S. Infantry. This regiment, I am informed, notwithstanding its contiguity to the 14th, was almost exempt from disease. Dr. PAGE, the post surgeon, states that river-water was used by both; the camps were equally well policed and the general management of each equally good. The only solution he was able to give of the difference in sanitary condition was the fact that the ground of the 14th was difficult to drain; that it had been ploughed more recently than that of the 11th and a good sod had not formed on it. With these facts before me it was my object to render the drainage as complete as possible, thoroughly to clean the barracks and to find a new source from which to obtain our supply of water. The drains were opened and improved, and an excellent spring was found convenient to the quarters, yet exempt from its drainage. The weather soon became settled, and the mud which had heretofore been very deep disappeared; everything apparently promised well. But about the 10th diarrhœa began to prevail, and a few days later symptoms of malarial fever appeared. On the 26th orders came to move across the bay to Havre de Grace. On the 27th numerous cases of remittent fever were developed, while acute diarrhœa had become epidemic. It is safe to say that during the last twelve days we have had a larger number of sick on our list than for the whole of the previous month. Two of the fever cases have assumed a typhoid type. The diarrhœal cases obstinately resist the ordinary treatment, quinine being essential to a cure in almost every instance. The general character of our men is good. They have been regularly and fully supplied with rations and their cooking has been unusually good. Our hospital accommodations have been excellent, and the sick universally bear testimony to faithful care and a full and ready attention to their wants.

Ass't Surg. A. A. WOODHULL, *U. S. A., 2d and 10th U. S. Inf., Sept.* 30, 1862.—There were, at least in this command, very few instances of any form of continued fever, and although a generally weakened state of the system was quite prevalent, and chronic cases of almost every disease fell into an adynamic and almost typhoid condition, there was

wonderfully little (certainly not one-half per cent.) of the true typhoid or enteric fever in the battalion. One reason may be found in the older and more seasoned condition of the men in the regular regiments. It is probable there were many cases among the newly-recruited forces, but I utterly repudiate the idea so often advanced that enteric fever was the prevailing disease. Of the few cases I saw some were remarkably mild, almost escaping detection, and one or two recovered in tents that I believe never could have survived in a building. No fatal case of enteric fever came under my notice in camp.

The occupation of a camp in which typhoid fever had prevailed appears to have determined its occurrence in some instances, as in that of the 23d Mass., recorded by Surgeon GEORGE DERBY. This regiment had endured many hardships and exposures such as have frequently been charged with the causation of the disease; yet the command continued healthy until a short time after it occupied the tents and camping ground formerly used by a confederate regiment that had suffered severely from typhoid fever. Within six weeks after the occupation of the infected camp one-third of the strength of nine hundred men became affected with fever and twenty-two of the cases proved fatal. Immediately after this the epidemic subsided, just as in the army as a whole it began to subside in 1861, when the susceptible individuals who responded to the first call of the President for troops had undergone their attack. Instances of this character manifestly show that bad air, improper food, exposure to wet and cold, great fatigue, anxiety and other depressing and insalubrious causes do not of themselves develop typhoid fever, although they may render the individual less able to withstand the violence of its attack.

The 17th Mass., on duty at New Berne, N. C., during the quarter ending June 30, 1862, was fully exposed to the general causes of sickness that operated on the army as a whole. Typhoid fever was the most prominent of the diseases affecting it, but even this did not prevail to a great extent. Surgeon GALLOUPE considered the comparative immunity enjoyed by his regiment as the salutary result of a careful observance of the general principles of hygiene. This may be allowed; but in connection with the slight injury effected by typhoid at this time, it must be remembered that his regiment had already been exposed to the special poison of the disease. The diminished susceptibility of the men must therefore be taken into account in estimating the value of the hygienic measures.

Surgeon GEORGE DERBY, *U. S. Vols., on the Medical History of the 23d Mass., from November, 1861, to June, 1862.*—[This regiment, numbering 900 men, left Massachusetts in November, 1861, and occupied a salubrious camp at Annapolis, Md., until January 6, 1862, when the men were closely stowed in transports for thirty-two days. To care in ventilation and cleanliness, including the daily airing of bedding on deck, is attributed the good health of the command during this period. On arriving at Roanoke Island, February 7, the men were exposed to rainy weather, and had to wade through the swamps during the engagement which took place there. On March 11 they embarked for New Berne, N. C., where, after the battle, they occupied tents abandoned by rebel troops, among whom, as was afterwards learned, fever had prevailed.] Until our arrival at New Berne, March 14, the health of the regiment, in spite of every hardship and exposure, had been good and but few deaths had occurred. We had, however, no sooner settled in camp at the Fair grounds, just outside the city, than typhoid fever of a severe type was developed. In April three hundred cases occurred with twenty-two deaths. It was the same fever we have in Massachusetts, characterized by tenderness on pressure in the iliac region, diarrhœa, tympanites and rose-spots. In a good many of the earliest cases the force of the fever-poison seemed to fall upon the brain, and a low muttering delirium, marked nervous depression and subsultus were observed; later in April the type was less severe and fatal. Treatment was almost entirely expectant: our chief reliance was upon fresh air, careful nursing and supporting the strength, treating more actively symptoms as they appeared. The causes of this severe visitation seem to be found in the depressing insalubrious conditions in which the regiment was placed on shipboard both before and after the battle of Roanoke and up to the time of its arrival at New Berne: Bad air, improper food, exposure to wet and cold, with great fatigue immediately following a long period of inaction. Some influence may also be ascribed to the occupation for several weeks of tents from which many of the enemy's sick had recently been removed. Since the subsidence of fever in the last of April the health of the regiment has been tolerably good. Many men were permanently disabled by the hardship and exposure which they had endured and have since been discharged.

Surgeon ISAAC F. GALLOUPE, *17th Mass., June 30, 1862.*—During the last three months this regiment has been stationed at or near New Berne, N. C. The country in the vicinity is low, level and marshy and the soil universally sandy. The climate at this season is favorable to health and no sickness has resulted from this cause. The food and

clothing have been ample and of good quality. The water is bad, but particular care in filtering or boiling has prevented any extensive illness from this cause. The tents used by the men are of excellent quality and (Sibley) pattern, but too few in number. The crowding together of from fifteen to twenty men in one tent has in some instances created a tendency to typhoid fever. The troops have been almost constantly engaged on picket duty, and exposure to night-air in low, moist districts and sleeping on the ground have been the causes which have operated most effectually in producing sickness. The disease most prevalent is typhoid fever, but even this has not existed to a great extent. It is remarkable that so little sickness has been produced by the causes which ordinarily are considered effectual in inducing disease. The comparative immunity from sickness which we have enjoyed I attribute to the constant care which has been exercised in relation to the sanitary condition of the men and their quarters. Daily inspections have been made of the food, clothing and tents, and the whole camp, including everything that might influence the health of the men, has received due attention; order, neatness, cleanliness and temperance have been enforced as military duties. The good results of this care give me great satisfaction; for, while disease has wrought extensive destruction among the troops in this vicinity, I have the satisfaction of reporting but three deaths from disease in this regiment during the quarter. Our hospital accommodations have been all that could be desired; the best houses in town have been used for hospitals, with all the contrivances for comfort and ease which our escaped enemies left behind.

Surgeon ISAAC F. GALLOUPE, *17th Mass., Camp Andrew, Baltimore, Md., Dec.* 31, 1861.—The duties and employment of the troops have been such as did not interfere with their health except in one instance. Five hundred men of the regiment went to the Eastern Shore of Virginia under General Lockwood in the month of November, where they remained about three weeks. During their absence one of them died of typhoid fever, and soon after their return to Baltimore twenty-four were taken sick with the same complaint in a severe form, which proved fatal in six cases. In all these cases the disease must have been contracted while the men were in Virginia.

Although the disease was apparently propagated in many instances by the infection of a locality there is no illustration on the records of a direct contagion from one individual to another. Fever cases in the general hospitals were often treated in the general wards, yet no suspicion of direct contagion was roused. Here, however, there was usually a larger air-space, better ventilation and greater attention to cleanliness than in the regimental or field hospitals. Surgeon BECK, 3d Ind. Cav., refers the production of typhoid fever to faulty methods of cooking and the fatigues and exposures of active scouting duty during the winter months; but his language, in speaking of the manner in which mild and unimportant attacks of other forms of disease terminated after contact with fever cases, is highly suggestive of a contagious quality of the latter. If contagion existed, the crowded regimental hospitals certainly afforded every facility for its activity. Although such an epidemic as affected the 23d Mass. at New Berne must be attributed to the operation of the same influences on the command as a whole, it is probable that in other instances the disease was propagated and its existence in the command prolonged by contagion from one hospital inmate to another. Some of the unwholesome conditions existing in the regimental hospitals may be appreciated from the statement of Surgeon COLGAN, 59th N. Y., that his few hospital blankets were used over nearly three hundred men in a period of three months.

Surgeon E. W. H. BECK, *3d Ind. Cav., Camp Carter, Md., Dec.* 31, 1861.—This battalion has been in the field about five months. My observations are confined to November and December. We have about five hundred men well mounted on their own horses, encamped in pine woods near the Potomac river on a hard clay soil holding water on its surface. This section of the country is somewhat miasmatic, the citizens suffering every autumn more or less with bilious affections. These troops, however, being from malarial districts in Indiana are not climatically affected by the transition. We have plenty of provisions, but lack vegetables—potatoes especially are scarce; we only have them once a week or fortnight. Our men eat too much grease, frying their hard bread in grease and eating fat bacon; this produces indigestion. We get beef as a general thing twice each week. The men have been very careless about cleanliness, many of them of their persons and nearly all of their quarters. They complain of not getting straw often enough to change. They have neglected changing their underclothing. The surgeon has labored to correct these evils. We have no proper winter-quarters, but live in tents with chimneys attached. Green pine wood is the only obtainable fuel. We are the only mounted troops this side of Washington on the Maryland side of the river. Our men have been employed as scouts, pickets, messengers and orderlies, giving them constant hard labor; they are on guard every second day. They go on scouting expeditions by squads and companies without tents, or, at most, only one for ten men, with bread and coffee only for food, depending for shelter, food and forage upon good luck, sleeping when night overtakes them in the woods or fields, making forced marches, taking prisoners to the city night or day, and all this during the cold weather of October and November. Until December 7 only about twenty-eight men in each company had overcoats. These hard marches and exposures, coupled with indigestion from the large quantities of strong coffee and grease or fat meat, brought many to hospital or to quarters with typhoid fever,

bronchitis and catarrh. Low fevers prevailed. Mild unimportant attacks of other forms of sickness coming in contact with these fevers, in defiance of our interference, gradually assumed, in a majority of instances, the formidable symptoms of delirium, involuntary discharges, subsultus, picking of bedclothes, sudamina, rose-colored spots and sordes. The cases required the strongest stimulants, from twelve to sixteen ounces of brandy being used per diem; and without this they die. Derangements of the digestion by fried food and fats, fatigue and exposure, I think brought on these low fevers.

Surgeon JOSEPH P. COLGAN, *59th N. Y., Camp Sherman, Fort Good Hope, D. C., January*, 1862.—Our hospital accommodations are confined to 4 two tents in which we are often compelled to crowd thirty patients with their attendants. We have been allowed twenty blankets, ten bedticks and ten pillow-cases for the use of all these persons for three months. This renders it necessary that these few blankets be shifted over nearly three hundred men in that time. The supply is wholly inadequate to provide covering for the number of men we are compelled to shelter, and but for aid received from the Sanitary Commission in the form of quilts and blankets our sick would often have had to suffer more in hospital than in quarters from want of covering.

From the statistics and special reports relating to typhoid fever a specific cause must be assumed to have existed irrespective of hard service, exposure to the weather, overcrowding, insufficient ventilation, defective police and other insanitary conditions. Apparently this special poison was capable of infecting localities, which afterwards transmitted the disease to new-comers. Probably, also, it infected the locality of an affected individual, leading to direct or indirect contagion in the crowded and ill-conditioned hospital ward, barrack-room, tent or winter-hut occupied by him. Certainly insanitary conditions of camps, quarters and hospitals developed the susceptibilities of the occupants, thus facilitating the propagation of the disease and increasing the gravity of its effects. But it is equally certain that these susceptibilities did not survive the attack. Among the cases submitted there are only two in which a second attack of typhoid fever is doubtfully suggested.* Local epidemics occurred but once in a regiment unless its ranks, depleted by the casualties of war, became filled up by new men, in which case the recruits suffered while the veterans remained unaffected. Notwithstanding the superlatively foul condition of the enclosure at Andersonville, Ga., and the presence of the special poison of typhoid fever, only sporadic cases occurred among the prisoners. This establishment was opened when the war was well advanced and the prisoners, mostly veterans, had lost their susceptibility to the typhoid poison. In the early part of the war prisoners were seized with typhoid fever in the absence of such conditions as existed at Andersonville. Ass't Surgeon DEWITT C. PETERS, U. S. Army, speaks of its presence in 1861 at some depots in the harbors of New York and Boston. It appeared in spite of careful attention to cleanliness, ventilation and other hygienic conditions. During a period of two months there were constantly under treatment, exclusive of convalescents, at least seventy-five of six hundred and thirty prisoners. Most of the cases consisted of typhoid fever in the persons of young and delicate subjects who had not attained their full development.

But many men had lost their susceptibility prior to enlistment, and the proportion of protected recruits was greater among city than among country levies. According to Ass't Surgeon J. T. CALHOUN, U. S. Army, regiments raised in the country and composed of farmers' boys suffered more from typhoid fever than city troops, although the former were superior to the latter in physique.

One of the healthiest regiments in this division and in the army is the Fourth Excelsior (2d N. Y. Fire Zouaves), composed almost entirely of New York firemen. Their losses from typhoid fever (if they have lost any at all from that disease) must be very small, while in the same brigade the 120th N. Y., composed of the better class of farmers' sons from the river counties of New York, although not having seen one-tenth the service or suffered one-twentieth the hardships of the regiment just referred to, have been almost decimated by typhoid fever.†

The information contained in the war reports of our medical officers relative to the

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† J. T. CALHOUN, in *Medical and Surgical Reporter*, Vol. X, Phila., 1863, p. 97.

etiology of typhoid fever is so meagre that to appreciate the causation of this disease in our camps it may be well to refer to the results of general professional investigation.

We speak of the typhoid-fever *poison*, but the facts established concerning the natural history of the disease are inconsistent with the idea of a non-vitalized organic compound as a causative agent. Such compounds on reaching the stomach or lungs are immediately absorbed into the blood, and if possessed of deleterious qualities manifest their toxic effects in a short time. Thus, prussic acid may be almost instantaneously fatal; and although death in other instances may not occur so promptly, the symptoms caused by the poisonous presence are speedily manifested. But, as is well known, the typhoid-fever cause lies dormant in the system for a period varying usually from one to three weeks. Even if we call in the unexplained catalytic action of the chemists, and assume an organic poison developed from the albuminoids of the body and capable of setting up an alteration in the living tissues so slow and gradual in its progress that the so-called period of incubation may be accounted for, we are met with the objection brought forward by observation and experiment that such organic compounds are unstable in their constitution, whereas the typhoid-fever cause is known to have remained in full possession of its virulence for months, perhaps for years. We must, therefore, assume a living cause for the disease, an organism which, on its admission into the intestinal or pulmonary tracts, requires time for its increase under the favorable conditions of heat, moisture and suitable pabulum, and for the manifestation of its presence by definite local lesions and constitutional disturbances.

Several observers, including KLEIN, EBERTH, KLEBS, KOCH and LETZERICH, have announced the discovery of a special form of micro-organism in the local lesions of typhoid fever. KLEIN discovered microphytes in such numbers and so definitely arranged that he believed their importance could not be questioned for a moment.* Nevertheless, the appearances thus regarded as organized were shortly afterwards shown to be merely results of the coagulation of albuminoid matter by the methods employed † KLEBS announced the presence, in the typhoid plaques, of bacilli which occurred with a constancy that proved their genetic nature.‡ Moreover, when animals were inoculated with the supposed specific germ symptoms analogous to those of typhoid fever, such as a febrile rise in temperature and enlargement of the spleen and patches of Peyer, were claimed to have been produced. But the causal relationship of a micro-organism to the disease has not been established. Septicæmic results of inoculation do not appear to have been excluded in considering the evidence. In fact, diseased conditions produced by inoculation with bacilli must be viewed with caution, since KLEIN has demonstrated the insusceptibility of the animals operated on to the typhoid poison.§ EBERTH did not find his short rounded bacilli in every case of typhoid, but KOCH, by the use of better staining methods, showed that they are never absent during the active stage of the disease. They are distinguishable from the micro-organisms of other diseases and may be artificially cultivated, but the specific disease has not been reproduced by them, as no susceptible animal has been discovered. Nevertheless KOCH considers the assumption warranted that this bacillus stands in an etiological relation to typhoid fever, while he regards that figured by KLEBS as an unimportant invader of the necrosed tissues.‖

* *Local Government Board Report*, London, 1875, p. 95. † *Proceedings of the Royal Society*, June 15, 1876.

‡ *Archiv. f. Experiment Pathol. und Pharmakologie*, Leipzig, 1881, Bd. XIII, p. 381 *et seq.*

§ KLEIN, p. 83, *op. cit.*, failed to convey enteric fever to animals by mixing their food with the fresh dejecta of patients suffering from the disease. He experimented on Guinea-pigs, rabbits, dogs, cats, white mice and monkeys, not only when they were in a healthy condition but after an intestinal catarrh had been set up by elaterium, aloes or castor oil. He used the typhoid material in its recent condition and also when more or less decomposed by keeping for some time mixed with water.

‖ GAFFKY, in *Mittheilungen a. d. k. Gesundheitsamte*, Bd. II, p. 372 *et seq.*

Although the typhoid germ has not been recognized its existence is generally allowed, and many of the conditions needful to its development have been demonstrated.

The passage of the germ directly from an infected person to another has been sometimes suggested, but none of the cases brought forward in illustration are without their weak points. When the instance has involved a large number of patients the influence of local conditions affecting the whole of the sufferers has not been excluded.* When, on the other hand, the instance has involved only a few persons in direct contact with the infected individual, an indirect contagion comes forward as a possibility.† LIEBERMEISTER denies the directly contagious quality, asserting that the idea is only a relic of the past, when the proper distinction between typhus and typhoid fevers was not made, and when whatever was proved of the one was supposed to be true of the other.‡

It is, however, generally conceded that the spread of the fever is in many instances attributable to an indirect contagion through the medium of infected intestinal discharges. VON GRIESINGER§ and BUDD‖ conceived that in all cases the disease was thus propagated. MURCHISON has recorded that of 1,048 hospital cases of typhoid fever under his care only one originated in the wards, and yet the night-stool often remained for hours unemptied: moreover, he has known other patients to sit over the evacuations of enteric fever patients without becoming affected thereby.¶ But although the discharges have thus been proved to be harmless when recent, it is well known that after a time, as decomposition progresses, they become capable of propagating the disease. Laundresses, by contact with soiled bed and body linen, are particularly exposed to attack. A want of cleanliness in the sick chamber, as when the patient has involuntary passages, may give rise to a suggestion of direct contagion, the materies morbi emanating not from the patient but from alterations which have taken place in the matter with which the bedlinen or blankets have been contaminated. The theory is that the spore or germ of the disease when it passes from the system has to undergo a stage of development outside the body before it is capable of inducing the specific fever:

* Murchison states that during twenty-two years, 1848–70, 1,088 cases of enteric fever were admitted into the London Fever hospital, but only 17 residents in the hospital contracted the disease, and most of them had no personal communication with patients sick of enteric fever. Of the 17 cases 9 were nurses, only 4 of whom were employed in the enteric fever wards; 1 was a laundress, 1 a medical officer, and 6 servants residing in a building detached from all fever wards. Twelve of the 17 cases occurred subsequent to 1864, and, with certain others, were referred to defects of drainage. "My experience [as the physician to the hospital] goes to show that when enteric fever originates in a hospital, there is as a rule something radically defective in the sanitary arrangements." See his *Treatise*, pp. 402–63. Sir W. JENNER, however, in his *Gulstonian Lectures on the Acute specific diseases—Med. Times and Gazette*, XXVII, 1863, p. 260,—attributes this prevalence among the nurses of the London Fever hospital to a concentration of the contagious principle by aggregation of the sick and imperfect ventilation. For he says: "I can remember only two instances of the extension of typhoid fever when cases of that disease were scattered through the wards of a *general* hospital; and in these cases it was the friends of the patient,—the mother in one instance, who had watched by her son night and day, who suffered."

† The following illustrations suggestive of direct contagion are from the *British Med. Journal*, Vol. II, 1880, pp. 732 and 739: SEYMOUR J. SHARKEY relates four cases which originated in the medical wards of St. Thomas' hospital in the persons of nurses employed in the wards. It is customary at this hospital for the same nurses to do duty alternately in the surgical and medical wards, remaining a month in each. Dr. SHARKEY emphasizes the fact that [illegible] the surgical wards, arguing that since the drainage and other arrangements are the same throughout the building the cases originating in the medical wards must have been due to contagion. JAS. MCNEILL, of the Homerton Fever hospital, gives an account of sixteen cases which occurred in 1876 in six houses on the sparsely settled island of Colonsay, near the Argyleshire coast. The distance between the houses in which the disease prevailed, with the exception of the second and third, was more than two miles; between the excepted houses there was only a distance of about one hundred yards of level ground. All the affected families obtained their water from different wells, and other families using the same wells were not affected. Each had a sufficient number of cows to provide its own milk supply; their other provisions were obtained from various sources. They had no drainage in common; subsoil water could not permeate from the premises of one family to those of another, and none of the houses were connected with sewers. Carbolic acid was used in the bed-pans and the passages were emptied into a hole dug some forty or fifty yards from the house. The disease was introduced by a convalescent from the mainland. It is difficult to exclude the recognition of a direct contagion in some of these cases. Thus, when the members of the fifth family were ill a woman came a distance of six miles to visit them; she did not stay in the house longer than ten minutes, nor did she partake of anything while there, but she noticed a very disagreeable odor from a recent alvine discharge, and at the end of twenty-one days, during which she was in her usual health, she was taken with typhoid fever. In an editorial notice, page 740 of the same journal, reference is made to a report to the Local Government Board on the prevalence of enteric fever in the Pontardawe Rural District by Dr. THEODORE PARSONS: A young man affected with the fever came from Swansea to the village of Mawr Llangnicke and infected six persons. "Altogether it does not appear that there was any mode by which the infection could have been conveyed from case to case except by direct transmission." A similar [illegible] in the township of Rhyndwyclydach is also mentioned.

‡ [illegible] *American Ed.*, Vol. I, p. 46.

§ [illegible] *Ursachen des Enterischen Typhus in München*. Leipzig, 1865, pp. 2 and 85.

‖ [illegible] *Intestinal Fever.—The Lancet*, London, 1856, Vol. II, p. 618.

¶ See [illegible] *Treatise*, London, 1862, pp. 450–451.

and while undergoing this change it multiplies, especially when in contact with masses of decomposing animal matter, as in the sewer, privy or dung-pit, so that an epidemic focus is there established, whence the disease may be propagated by exhalation or water-carriage or both, in accordance with local conditions.

Although emanations from specifically infected matter have oftentimes been recognized as the cause of local epidemics, and in sewered cities as the cause of the endemicity of the fever, the water-supply must be held responsible in many instances for the outbreak. Nor is it difficult to understand why this should be. If the privy, cesspool, sink or manure pile become a hotbed for the propagation of the specific germ, that germ will percolate in the usual line of drainage and the subsoil and its water will become infected. In localities where the inhabitants are careless as to the cleanliness of their surroundings even the surface of the area of drainage may become infected with the excreta of some primary case, as it has already been contaminated by the accumulated filth of years of uncleanly occupancy. The soil of cities is generally extremely foul; a sewerage system in probably all instances was introduced only after the soil was honey-combed with sinks and vaults or cavities filled with filth. Wells in densely populated sections are, therefore, specially liable to become infected. In certain outbreaks the disease has been traced to the waters of a given well, persons living in adjoining houses having been affected or not according as they used the infected water or obtained their supply from some other source. Shallow wells are necessarily more exposed to infection than deep ones; but deep wells and springs may become infected not only by leakage from the overlying surface or subsoil, but even from their more distant surface origin, as in the case of the Lausen epidemic,* where intestinal discharges contaminated the surface on one side of a mountain and caused enteric fever in those who used the water of the springs on its other side.

River-water polluted with infected sewage has also been known to occasion the disease, as in the case of the epidemic at Plymouth, Pa., in 1885.†

A violent and general outbreak in a community was needful to establish an appreciation of the propagation of typhoid fever by the water of running streams; for the cases that ordinarily prevail in a city having a river-water supply more or less contaminated by the sewage of the upper settlements are attributed to sewer-gas, exhalations from specifically infected foci and the use of specifically contaminated well-waters. Perhaps each of these factors has its influence on the prevalence of the disease, but so long as the epidemic at Plymouth is attributed to the pollution of the mountain stream which filled its reservoirs, and the Lausen outbreak to infected sewage in the radicles of its water-supply, it will be difficult to accept the doctrine that river-water is harmless in this respect.

The evidence on behalf of the wholesomeness of a river-water that has been tainted by sewage consists of a demonstration by chemical means of the purity of the suspected water. It has been shown that after a flow of a certan number of miles the water of a running stream becomes as pure as it was previous to the inflow from a certain sewerage system. Sedimentation and the fermentative processes that accomplish the reduction of dead organic matter to the inorganic conditions of ammonia, nitric and carbonic acids, do much to preserve the purity of our rivers, as determined by chemical analysis, but it is a mistake to consider that this purity is synonymous with wholesomeness. Well-waters that have given excellent results on analysis have been convicted on other evidence of having propagated typhoid. The virulent essence of the disease cannot be detected by chemical means; and it may be present when the natural processes of purification have destroyed the ordinary sewage matters which at an earlier period were associated with it. These processes as exercised on a water which percolates through the soil into a well are more powerful in their action than when operating on the organic matter of a running stream. This is shown by the fact that well-waters are on the average so much purer than surface-waters that both cannot be rated by the same valuation of the analytical results. Organic impurities are found and considered allowable in river-waters which, if present in filtered or well-waters, would be regarded as indicating a dangerous or unwholesome quality.

* In 1872 an epidemic occurred which was traced to the springs that supplied the village with water. These springs were derived in part from an adjacent valley, the drainage of which found its way by an underground channel to the Lausen side of the mountain ridge and brought with it the typhoid infection. The connection between the valley on the one side of the ridge and the springs on the other was demonstrated by the use of salt. The failure of wheat starch to pass through with the water and salt showed that the communication was not by direct channels, but in part by percolation through porous strata. The particulars of this epidemic are given by CAYLEY in his Croonian Lectures *On some points in the Pathology and Treatment of Typhoid Fever*, London, 1880, p. 8, and are quoted at length by WILSON, p. 128 of his volume *On the Continued Fevers*, New York, 1881.

† *First Annual Report State Board of Health and Vital Statistics of the Commonwealth of Pennsylvania*, Harrisburg, Pa., 1886, p. 176.

But the agencies which purify a well-water from ordinary sewage matters fail to destroy the typhoid cause: and, since these are impotent, it is inconsistent to assume that the weaker influences operating on the water of a running stream would be more efficient. Hence we may conclude that the typhoid cause having once entered a river-water will retain its virulence, although organic matter of a less stable nature associated with it may be destroyed. Moreover, typhoid fever is so prevalent a disease that it is impossible to consider the sewage of a large city as other than an infected and correspondingly dangerous sewage.

As bearing on this question it is of interest to observe that typhoid fever is relatively less frequent in cities that exercise care in the exclusion of sewage from their water-supply. Where the drainage area furnishing the supply is carefully guarded from excremental taint typhoid fever is at a minimum. Where the water-supply is taken from a river containing the sewage of large cities typhoid fever prevails extensively and constantly. Its prevalence may be said to be proportioned to the amount of sewage inflow into the water-supply. Sewerage-works and water-works are intimately related; the one quickly follows the other in the sanitary history of our growing cities. Hitherto it has been customary to attribute all improvement in the health of a community to the sewerage-works; but it may be inquired if perhaps the greater part of the benefit is not really due to the influence of a purer water-supply,—one less contaminated by sewage than the well- or river-water that was previously used. Certainly this appears to be the case so far as typhoid fever is concerned; for Baltimore, Md., which has no system of sewers, has experienced during the past twenty years, since the introduction of its general water-supply, as large a decrease in the death-rate from typhoid fever as any city which has been sewered as well as systematically supplied with good water. The health reports of New Orleans, La., also illustrate the connection between comparative freedom from typhoid fever and a water-supply untainted by sewage. That city labors under many unhygienic disadvantages on account of the peculiarity of its site. There is no sewerage system; but, fortunately, there are also no wells. Mississippi river-water is pumped up, but is used mainly for street washing and as a safeguard against fire. The domestic water-supply comes from raised cypress-wood cisterns which, while often foul from accumulated sedimentary matters washed from the roof, is never tainted with sewage or its associated typhoid germ. In view of these considerations a river-water that has been once contaminated by sewage must be regarded as dangerous in this connection, no matter how excellent a character may be given it by chemical researches.*

Many epidemics have been ascribed, especially in England, to an impure milk-supply. The well on the dairy farm has become infected and its water, used illegally as a diluting adulterant, has introduced the germ of the disease into the milk. The organic analysis of milk is not required to show that it contains all the proximate organic principles needful to the support of human life, as this is demonstrated in every nursery. Theoretically such a liquid, if kept at an appropriate temperature, furnishes as favorable conditions for the multiplication of the germ as the human system itself. The instability of milk is well known. Professor LISTER has demonstrated that its coagulation is due to the influence of a bacterium (lactis), and that if it be protected from invasion by this bacterium and exposed to other germs ordinary coagulation will not take place, but instead, other changes will be developed depending on the nature of the micro-organisms which have been introduced.† Milk must, therefore, be accredited with notable qualities as a culture fluid for micro-organisms. In some cases, in which the infected water was used only to rinse out the milk-pans, a multiplication of the germs so introduced must be assumed to account for the disastrous consequences which followed in the line of the milk-supply.

There is a difference of opinion as to whether the disease-germ is always derived from a previous case. Some hold that the disease may originate *de novo*. MURCHISON conceives that the miasm may be generated in decomposing animal matter in the absence of the dejections of a typhoid fever patient, that at some particular stage of the process a pythogenic fever-cause is developed which, if taken into the human system, will produce enteric fever as truly as if it had been propagated from a previous case. He allows that enteric stools may be more prone than other organic matters to the fermentation by which the poison is elaborated, but denies the existence of a specific germ. It is a matter of common observation, however, that places notoriously filthy from excremental accumulations, which on this theory ought to be the breeding places of the fever, have continued exempt from it for years until infected

* See SMART, *On Wholesome Water for Cities and Towns.—Phila. Med. Times*, Vol. XVI, 1886, p. 697.

† JOSEPH LISTER,—*On lactic fermentation and its bearing upon pathology.—Braithwaite's Retrospect*, Vol. LXXVII, 1878, pp. 1–8.

by the discharges of an imported case. City practitioners, who have the fever always with them and the sewers constantly contaminated with the discharges from such patients, generally regard the disease as propagated by a succession of patients. But the country physician, who does not have it always with him,—who, on the contrary, has it springing into existence in his practice at isolated houses without a recognizable connection with any previous case in the locality,—is often inclined to quote his experience as throwing doubt on the general application of the accepted theory of indirect propagation from case to case, if not indeed as warranting a belief in a *de novo* origin.

Dr. CABELL of the University of Virginia has protested against the assumption of contagion, direct or indirect, as the only means of propagation of typhoid fever. He communicated with the members of the Virginia Medical Society and others, soliciting their views on the subject and a report of the observations on which they were based; and in reply to the enquiry: Can you recall any case of typhoid fever originating under such circumstances as to exclude the probability of the importation of the disease from some other locality? he received 58 affirmatives in a total of 69 responses.* Dr. PINCKNEY THOMSON gives strong expression to a belief in an origin independent of the contagion of a previous case, and instances certain cases of spontaneous origin in sparsely settled districts where previous cases could not have escaped detection.† FARQUHARSON of Iowa conceived the disease in America to be due to exposure to emanations from the decay of vegetation during the hot season, and wholly independent of contagion from the intestine of a previous case as urged by BUDD, or of fæcal accumulations as claimed by MURCHISON.‡ To illustrate the character of the testimony on which these opinions are based the following are quoted from Dr. CABELL's paper:

Dr. L. B. EDWARDS, Richmond, Va.: A farmer who lived eight miles from Lynchburg, near the base of the Tobacco Row mountains, had not for months before his attack been where there was sickness. For several weeks prior to his attack he had been engaged personally in clearing and plowing some new ground on the side of the mountain. There was nothing in the history of the case that indicated an importation of the disease.

Dr. W. H. BRAMBLETT, Newburn, Va.: I can recall a number of cases occurring under such circumstances as to exclude the probability of importation. In a thinly settled country, as that to which my practice is most restricted, there are many isolated neighborhoods cut off by mountains and streams from other portions of the county. The families composing these communities never have a visitor from a distance; they rarely go out of their own neighborhood and never out of the county; in fact they occupy a position so cut off from communication with the rest of the world that the appearance of the disease in their midst would appear irreconcilable with the modern theory of its propagation. Some of these neighborhoods I have had under observation for ten years, and it is here that typhoid fever often seems to have its beginning, and can be traced to none of the ordinary sources of contagion agreeably to the modern theory. The same community is never visited on the year following an outbreak, and new outbreaks occur in communities which have not been invaded for ten years or never before at all.

Dr. W. H. MACON, Hanover County, Va.: Mrs. E., living in the county of Kent, had typhoid fever for thirty or forty days, convalesced, relapsed and died. She had not been anywhere to contract the disease; had not left her farm, certainly not the neighborhood. No other case occurred. This case must have originated there, if I may use the word, spontaneously, and several other cases similar to this might be mentioned.

Dr. BEDFORD BROWN, Alexandria, Va.: I have many reasons to believe that typhoid fever may be generated *within* the system spontaneously. In my own experience cases have originated on high isolated points where the locality was sterile, the drainage most perfect, the water pure and limpid, gushing out from rocky mountain sides. In one of these instances the building was new, made of wood, airy and comfortable, supported on pillars two or three feet high, underneath which the pure mountain breezes had free access, and the situation was on a high mountain point without the vestige of a local cause in the form of privy, sty, cesspool, inclosure, decaying animal or vegetable matter. Yet in this building were two well-marked cases of malignant enteric fever following in rapid succession. Neither of these victims had left the premises for weeks previously.

* *On the Etiology of Enteric Fever*, read before the American Medical Association in 1877.

† In the Report of the State Board of Health of Kentucky for 1883 he says: "As I study the literature of the etiology of typhoid fever, coupled with an experience in the practice of medicine for thirty years, I am forced to the conclusion that typhoid fever does originate from other causes than the contagion of a previous case."

‡ *The Typhoid Fever of America*, read at the meeting of the Iowa State Board of Health November 2, 1883.

Dr. ALBAN S. PAYNE, Fauquier County, Va.: I remember as far back as the winter of 1834 that a gentleman of wealth, living four miles west of Warrenton, proposed to emigrate with his negroes during the coming spring to Mississippi. In the winter months a strange malady broke out amongst the negroes, and by the following spring he had lost thirty by death. This was typhoid fever. There was no sickness anywhere else of a serious character within a hundred miles of this plantation. It was a very dry winter, and the springs on the plantation were never of the best. In all other respects the topography was good. Privies are seldom used by these hardy mountain people, and excrementitious matter is generally dried in the sun or carried off into water courses by the rains.

Several instances are given in which the disease was attributed to the decay of wood, as in outbreaks that sometimes occurred in the negro cabins of the slaveholders. Concerning these Dr. CABELL observes that:

There seems to be little or no room to doubt the existence of a morbific influence derived from the old cabins, but that the factor in question is decaying timber is not, I think, equally certain. * * * In a few cases of this kind, which have fallen under my own observation, another and very potential factor was discovered in a mass of sludge, which had been formed under a very badly-jointed floor by the drippings of slops, and possibly, to some extent, of the excreta of children. In these cases there was thus soil-contamination of the worst sort.

An outbreak of typhoid fever, apparently independent of a previous case, occurred among the U. S. troops engaged in the Modoc campaign in 1873. The command, consisting of B, 1st Cav., B, 4th Art'y, F, 21st Inf., and E and G, 12th Inf., was stationed at Fort Klamath, Oregon. The following is from the report for September, by Ass't Surg. HENRY MCELDERRY, U. S. Army:

Nine of the ten cases of typhoid fever reported as taken sick during the month belong to Co. G, 12th Infantry, and were received into hospital from company quarters. The company at the time were quartered in tents near and to the north of the stockade in which the Modoc Indian prisoners were confined. These men were all taken sick within a few days of each other. Upon inspecting the company quarters with a view of ascertaining the cause of the disease, it was found that the common tents, in which the men were living, were in almost every instance floored with boards, and that the boards rested directly on the ground or on poles, and that no provision whatever was made for ventilation underneath the floor. Upon the floor being taken up in several of the tents the ground underneath was found to be damp and mouldy. I recommended to the commanding officer that the company should be removed to a new locality, the tents repitched; that if the tents were floored the boards should be raised at least eight or ten inches from the ground and provision made for ventilation underneath; that at least twice a week the tents should be raised and the ground exposed to the sun. These suggestions were favorably considered and acted upon by the commanding officer, with the result of completely arresting the disease. One case of fever was received into hospital the day after the change was made. No case has occurred since.

Exception may be taken to this report in that it fails to state the grounds on which the disease was regarded as typhoid. The clinical records of the post do not preserve a circumstantial account of any of the cases, but from the data furnished by the registers of sick it is evident that the disease, so far as our present knowledge extends, could have been no other than the typhoid affection. Although no new case occurred in Co. G, 12th Inf., during the month of September, as stated in MCELDERRY's report, two cases appeared early in October. The September cases were taken sick on the 20–24th; the two subsequent cases on October 8. Of the twelve cases ten were returned to duty after an average stay of two months in hospital, one ended fatally and one was discharged for disability. The alimentary canal of the fatal case was forwarded to the Army Medical Museum, where, on examination, the stomach and upper part of the small intestine were found in normal condition; Peyer's patches were progressively enlarged and some of them slightly ulcerated—those immediately above the ileo-cæcal valve were greatly thickened and mammillated but not ulcerated; the colon was dotted with enlarged and ulcerated solitary follicles, which were most numerous in the descending portion. The specimen was accompanied by the following special report:

Private Henry Everett, Co. G, 12th Inf., was admitted to post hospital, Fort Klamath, Oreg., Oct. 8, 1873, with the ordinary symptoms of typhoid fever. The patient seemed to be much prostrated and very ill. He said he had been sick for several days. Five grains of sulphate of quinine every four hours, acetate of ammonia and beef-essence every two hours were prescribed, with milk and eggs three times a day; the patient was sponged occasionally with

warm water. As he seemed to improve under this treatment it was continued during the four following days. Half an ounce of whiskey every two hours was added on the 12th, as the patient appeared weaker. His bowels had been acting regularly and never oftener than twice in the twenty-four hours; but on the evening of this day he had several passages, one of which, about daybreak of the 13th, contained a considerable quantity of dark-colored blood. A camphor and opium pill every four hours was prescribed, with turpentine emulsion and persulphate of iron every two hours and a teaspoonful of whiskey every half hour. He had another abundant hemorrhage from the bowels about noon and a third about 4 p. m., fifteen minutes after which he died. *Post-mortem* examination revealed ulceration of the patches of Peyer and erosion of a mesenteric arterial branch. The spleen was greatly enlarged and much softened. The other organs appeared normal.

With reference to the case discharged for disability the post records give the following information:

Private Landmesser, Co. G, 12th Inf., was taken sick Sept. 21, 1873, with typhoid fever, and discharged Aug. 19, 1874, for consumption following typhoid fever.

It may also be objected that a possible previous case from which the ten September cases were derived is not satisfactorily excluded. Of course Dr. McElderry may have overlooked it; but there is no doubt that he gave full consideration to all the possibilities before reaching his conclusions as to the cause of the disease. Certainly his men were and had been for months so situated as to allow a full understanding of the conditions affecting their health. In fact it seems impossible for the previous case to have been imported or his men exposed to its influence without his knowledge.

An interesting case, reported by Ass't Surgeon Hoff, U. S. Army, will be referred to in another connection.*

Similar experiences in Europe and in India have also been recorded.† The argument against the value of such cases as conclusive of a miasmatic origin, independent of a specific contamination from a pre-existing case, is based upon the persistency of the typhoid-fever germ. It is known to preserve its vitality, and presumably to multiply, under favorable conditions, for many months; and there is no reason for supposing that it might not thus remain potent for an indefinite period. A certain covered ditch or drain which has been disused for years is opened, and those who have been exposed to its exhalations become shortly after prostrated by typhoid fever and may form the nucleus of a series of cases constituting a local outbreak. A pile of manure, the accumulation of years at a country house, is dug up and carted away, and those who have been engaged in the operation subsequently

* See *infra*, p. 522.

† *The British Med. Jour.*, in one of its issues for 1880, Vol. I, pp. 733 and 740, has two articles on isolated and apparently spontaneous cases of typhoid fever. R. Bruce Low, Medical Officer of Health, Helmsley, Yorkshire, shows that he has had frequent opportunities of investigating the origin of typhoid cases, free from the ordinary sources of error which surround similar inquiries in large towns and populous centres. Sewer gas, infection in the water or milk-supplies, and direct contagion were excluded from the generation and propagation of his cases by the conditions under which his patients dwelt. The first which he relates requires an acknowledgment of a *de novo* origin or of its connection with a case which had occurred in the house thirty years before. Murchison would have found no difficulty in assigning to this case a pythogenic origin, as the privy was full to the level of the seat, the smell from it offensive, the cottage damp, dirty and overcrowded, and the general habits of the inmates in keeping with their surroundings. As the patient suffered from repeated attacks of diarrhœa prior to the development of enteric fever, Dr. Low suggests the possibility of the latter being due to the progressive elaboration of a specific poison from a succession of attacks of non-specific diarrhœa originating in filth fermentation. In the second instance a study of the possible causes points to one of three theories of origin: 1st. A foul and overflowing privy near the house, but seldom used by the patient; 2d. A momentary exposure to a disgusting odor from a bullock's hide in an advanced state of decomposition; and 3d. Drinking a cup of tea in a house in which a fever case had been treated three years before. P. Herbert Metcalf mentions a characteristic case of enteric fever which occurred on Norfolk Island, in the Pacific, in January, 1880, without any apparent connection with a previous case. The island is four hundred miles from the nearest inhabited land. In 1868 a febrile epidemic of some kind prevailed, and in the beginning of the year 1877 a man was *reported* to have died of enteric fever. The gentleman who was taken sick in January, 1880, reached the island four months before his attack. Several years before he left home he lost a brother and sister from enteric fever, but since that time he had not been in contact with the disease. This patient had used water from a well that had the reputation, unknown to him, of communicating with an open cesspool. On cleaning out the well its bottom was found to be layered with four feet of foul mud in which were embedded the skeleton of a duck, a pig's jaw, three empty preserved meat-cans, thirty old tin mugs, etc.; but it is conceived that the specific poison of typhoid fever could not have been present, even supposing a previous case of the fever to have existed, for the cesspool contained only kitchen waste, and the open privies were far from and on a lower level than the well. Niemeyer, in his *Text Book of Practical Medicine*, Vol. II, Am. Trans., New York, 1869, page 573, says that the miasmatic origin of abdominal typhus is rendered probable by cases occurring in places removed from travel, where no case of this disease has occurred for years and where there is not the slightest suspicion of a contagious origin. Surgeon General C. A. Gordon, in his report on *Enteric Fever in relation to British Troops in the Madras Command*, Madras, 1878, has shown that fevers with enteric lesions occur in India which cannot reasonably be accounted for either on the assumption of a direct propagation or on that of a filth origin *de novo*. Sir Joseph Fayrer, in his Croonian Lectures *On the Climate and Fevers in India*, London, 1882, p. 59, holds that fever in India with diarrhœa, Peyerian ulceration and typhoid symptoms is not necessarily caused by a specific contagion derived from fæcal matter or from the intestines of another person.

sicken of typhoid fever and may transmit the disease by their uncared-for discharges as effectually as if they had received it from the discharges of a recent patient. The antecedent case is assumed to have existed and to have contaminated the drain or pile. In certain epidemics of obscure origin which have been thoroughly investigated, the previous case has not unfrequently been detected. The failure to discover it has therefore been regarded rather as illustrating the difficulties in the way of a thorough knowledge of the facts than as demonstrating the non-existence of the previous case. But it is claimed, on the other hand, that if in many instances a careful examination of all the points bearing on the possible origin of a typhoid outbreak fails to discover a connection with a previous case of the disease, we are warranted, notwithstanding the frequent superficiality of our modes of investigation as compared with the obscurity of Nature's methods and the subtlety of the poison in question, in assuming that in one at least of these many instances the whole field has been viewed and the presence of the previous case excluded. If this be ceded in one case the argument is at an end. The truth will never be known if evidence which does not agree with our preconceptions be excluded. All intelligent testimony should be admitted as tending to an accurate knowledge of the matter in question. When an educated physician, possessing a full knowledge of the facts and not unlikely a personal acquaintance ranging over years with the house, its inmates and neighborhood, has examined the subject and failed to trace a specific infection, it is more reasonable to refer the origination of the fever to local fermentative conditions than to assume that the specific germ has been in existence there for years without manifesting its presence, or that some unknown person, necessarily a walking case of the disease, had visited the premises and left no other trace of his presence than the infection of the privy or well. To this latter supposition, absurdly one-sided as it appears, we become reduced in many instances of country-house typhoid if the spontaneous origin of the fever be denied.

In a recent treatise on the continued fevers J. C. Wilson* denounces the theory of a spontaneous origin. He says:

> **If we assume that a fever so specific in its clinical and anatomical characters must be due to a specific cause, and that the specific cause is an organism of some kind, the view that the poison does not arise independently but in every instance from a parent stock becomes a logical postulate from these assumptions; otherwise we are forced to accept the theory of spontaneous generation.**

This author's enthusiasm in behalf of a specific germ transmitted from case to case leads him too far. His argument as stated is correct, but it does not apply to the case in hand. The view that the poison arises in every instance from a parent stock is a logical postulate from the assumptions, but not that the parent stock is in every instance propagated in and discharged from the human intestinal canal. Dr. Wilson does not touch upon this point, which is nevertheless the very point at issue. Moreover, spontaneous generation on the one hand, and on the other a transmission from case to case through the sewers, which Dr. Budd fancifully yet practically regarded in this connection as a continuation of the diseased intestines,† may not be presented as the horns of a dilemma. Ague is a specific disease, and if we assume it to be due to a specific cause and that the specific cause is an organism of some kind,—all of which may be readily allowed, as it is considered proved by many observers,—the view that the poison does not arise independently, but comes in every instance from a parent stock grown in the human system, does not follow as a logical postulate from the assumption, nor are we forced to subscribe to the theory of spontaneous generation,—for the

* *Wood's Library of Standard Medical Authors*, New York, 1881.

† *Lancet*, Vol. II, 1856, p. 618.

ague-germs live their lives and generation follows generation in congenial soils and circumstances.

The apparently spontaneous origin of typhoid fever, noted by many observers, indicates that, as in ague, we have a miasm or germ, specific in character, propagated in and evolved from certain matters in the soil under favorable conditions as to heat and moisture; yet, as proved by other experiences, the disease thus originating *de novo* is capable of being transmitted from case to case by means of decomposing excreta containing its infection. In other words, typhoid fever is a truly *miasmatic-contagious* disease.

Ague, including the more pernicious manifestations of its cause, is a purely miasmatic disease of telluric origin, although in its literature there are not wanting cases which suggest a contagious quality. Dysentery is usually referred to miasms of telluric origin, yet in many instances, especially where cases are aggravated, as during an epidemic, contagion from the excreta is allowed; typhoid fever follows dysentery in this respect, its contagious qualities being more frequently observed. The two serve to connect the purely miasmatic intermittents with the purely contagious disease, small-pox, which the observations of centuries have indicated as requiring the human system as a nidus for its propagation.

LIEBERMEISTER uses the term miasmatic-contagious in a different sense to that given above.* He does not allow that typhoid fever is contagious as is small-pox, passing directly from person to person; but follows BUDD in his theory that the germ thrown out from an infected person is propagated in decomposing organic matter, and thereafter evolved to infect the human system and be again thrown out. On the other hand he considers it to differ from the purely miasmatic class in that it originates outside the body only when an infected body has furnished the germ. The poison is therefore miasmatic, but with a qualification. As the tape-worm cannot be transmitted directly from person to person, but has to pass through another stage of development before appearing again in this form, he considers that a development outside the body is needful to the reproduction of the germ of typhoid. The fresh discharges of an enteric-fever patient contain the germs in that stage of their development in which the living body does not furnish the conditions necessary to their propagation. They are therefore harmless. But if they remain until decomposition has begun, and especially if in contact with masses of decomposing matter, a large propagation occurs and a development which empowers them to produce the specific fever when introduced into the human body. To classify the typhoid germ and others resembling it, such as those of dysentery and cholera, which he regards as miasmatic with a qualification and contagious with a qualification, he has suggested the term miasmatic-contagious; but it is submitted, with due respect to the opinion of so high an authority, that as regards the term it does not convey the theoretical ideas on which it was framed, that is, the assumed peculiarities of the class which it was intended to define; and that as regards the theoretical ideas, they cannot be sustained in view of the occurrence of typhoid fever under conditions which exclude the possibility of a germ from a previous case. On the other hand, in using the term miasmatic-contagious in the sense of the meaning of its components, as has been done in this discussion —miasmatic, as originating without the system, yet capable of producing a specific disease when taken into the system, and contagious, as capable of direct or indirect transmission from person to person, full expression is given to theoretical views, which must be allowed to be in accordance with observed facts.

* See his articles on the infectious diseases and the etiology of typhoid, in Vol. I, *Ziemssen's Cyclopedia*.

What the conditions may be which are needful to the propagation or evolution of the typhoid germ is not definitely known. The disease appears in a community on the disappearance of ague. The purely malarial fevers have their habitat in the wilds or in forming settlements, while typhoid fever appears in formed settlements.* This has been so well recognized that ague has been called a disease of the country and typhoid fever one of the town or city.† But it has been observed that the latter fever has prevailed along mountain slopes, while ague has been its cotemporary in neighboring valleys; and that ague, prevalent in wet seasons, has given place to typhoid during long-continued droughts. This suggests the possibility, nay, the probability, that moisture has to do with the evolution of the ague-poison and a comparative dryness with that of the fever under discussion.‡ This comparative dryness is the result of the development of the village into a town, where the malarial gives place to the typhoid germ evolved from the soil. Later, when sewers are built and the town evolves into a city, with typhoid fever endemic, indirect contagion manifests its influence in the propagation and continuance of the disease. Dr. CABELL quotes several instances of the supervention of endemics of typhoid on those of malarial fever when the moisture of the soil has given place to dryer conditions; of the cotemporaneous existence of the two fevers in neighboring localities having different degrees of moisture in the subsoil; of the replacement of typhoid by malarial fevers when, by unusual seasonal or other influences, the moisture has been again restored, and of the coincident occurrence of both fevers in the locality and apparently indeed in the individual at certain intermediate stages in the progress of the soil from moist to dry or the reverse. The following are given as illustrations; but many such may be gathered from recent literature, particularly from the Transactions of the American Medical Association and of State and local medical societies.

Dr. R. S. PAYNE, of Lynchburg, Va., recalling the changes produced in the medical topography of that city and its surroundings by the construction of the James River and Kanawha Canal, which was commenced in 1831, says: The low grounds between the hills and the river banks were watered by springs from the hills, and as the river bank was higher than the foot of the hill the low grounds were necessarily swampy in character, and until the grounds were drained by the canal we had ague and fever along its line every summer and fall. While the canal was in progress of construction the laborers engaged in this work, as well as those upon the farms for twelve or fourteen miles below Lynchburg, suffered severely with congestive chills. If the patient did not die during the third or fourth chill the case generally became complicated with severe diarrhœa, and the fever assumed a continued type, frequently marked with tympanites and delirium. After the newly lifted earth had been exposed to the winter's frost and a summer's sun the miasmatic features were greatly abated, and the fever now generally assumed very distinctly the characteristic features of typhoid. Still, on the same farms and sometimes in the same families, you would see during this epidemic a well-marked case of chill and fever, but if not arrested within five or six days, and especially if the patient took an aperient, however mild, a diarrhœa would set in, the intermission would be less and

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* It is hardly needful to furnish illustrations of these well-known facts. In recent years every medical man who has gone West to grow up with the country has experienced the so-called *change in the type of fevers*. Many references to it may be found in the *Transactions of the American Medical Association*, as, for instance: "In all the Southern medical journals of recent date we find it stated that throughout our whole malarial middle country, and indeed, though less strikingly, in our lower alluvial districts also, typhoid fevers are becoming more and more frequent in places and settlements and under circumstances where hitherto the ordinary autumnal remittents and intermittents prevailed exclusively."—S. H. DICKSON, Vol. V, 1852, p. 157. "We have heard no remark regarding our fevers oftener made by physicians in different parts of the State than that which refers to the evident annual increase of continued or typhoid fever over the ordinary endemic or bilious fever of the country, the former being disposed as it were to displace the latter as the improvement of the agricultural districts advances."—*Report of a Committee on the Diseases of Missouri and Iowa*, Vol. VIII, 1885, p. 106. A similar change has attended the settlement and improvement of reclaimed lands in other countries. Thus, according to LAVERAN,—*Traité des Maladies et Épidémies des Armées*, Paris, 1875, p. 248:—"In the early years of the occupation of Algeria by the French typhoid fever was as rare as malarial fevers were common, and this was one of the principal facts which served as a basis for the theory of antagonism; but more recently the former disease has become as frequent an affection among the troops in Algeria as among those serving in France: In 1868 the army of the interior lost 3.05 men per 1,000 effective and the army of Algeria 4.63 per 1,000 from typhoid fever."

† Although in growing cities malarial fevers are replaced by typhoid, a noted exception to this is found in New Orleans, where the [illegible] is of malarial origin. In this city there are no sewers; excremental filth is collected, removed and consigned to the river under the superintendence of the Board of Health, and the water-supply is free from soil contamination by its passage in raised wooden pipes. The [illegible] nation of the comparative rarity of typhoid fever; but since, according to Dr. JONES, not only the city but the entire alluvial portion of Louisiana suffers less from this disease than the more elevated parts (see the *Report of the Board of Health of Louisiana*, 1881, p. 219)—it seems probable that the water-logged condition of the soil is an important factor in determining the prevalence of the paroxysmal fevers and the infrequency of typhoid.

‡ MURCHISON has shown that in England the seasonal occurrence of typhoid fever is after hot and dry weather, from August to November, and that years, such as 1869, more [illegible] for decreased prevalence have been unusually w[illegible]. See his *Treatise*, [illegible], p. 11, 12, 13.

less marked, and ultimately the fever take a typhoid character. This peculiarity was confined to the population residing on the river. About two and a half or three miles from the river typhoid fever broke out on a plantation with a large family of negroes, and many died. There was no malarious complication here. The only chill I saw was produced by myself in sponging a patient with cold water with a view of reducing the high temperature. A chill came on by the time I had sponged the face, neck and one arm, and the patient died in less than two days.

Dr. R. T. LEMMON, of Campbell County, Va.:—I have had frequent occasion to mark an apparent antagonism between typhoid and malarial fevers. In the year 1845 this section of the State was fearfully scourged by a typhoid epidemic. The backbone or ridges suffered more severely, while the malarial region on the banks of the Staunton River and some large and old mill-ponds escaped entirely, the usual amount of ague prevailing there. The line of demarcation was very apparent. Subsequently I have seen cases of typhoid within the malarial region, but no cases of intermittent at the same time.

Dr. S. PUTNAM, of Montpelier, Va.:—During a somewhat extensive country practice for thirty years and more, typhoid fever has more generally occurred as an epidemic from August to November, particularly in dry seasons, after a succession of *yellow, smoky days, without storm, winds or electrical display*, the beds of streams and ponds having become dry or half dry and stenchy, and vegetation parched or shriveled. Under these circumstances, constituting, as I conceive, an epidemic influence, typhoid fever has often soon appeared, more frequently in families residing on the banks of streams or ponds, but often also in the farm-houses scattered over the hills here and there, without any possibility usually of tracing the importation of the disease or its spread from house to house by contagion. Under these circumstances in the fall of 1865 I saw thirty-seven cases and made notes of them.

The following from a paper by J. H. CLAIBORNE, of Petersburg, Va.,* is also of interest in this connection:

Some further light is probably thrown upon the nature of the disease in this immediate locality from the following facts: During the past year (1879) there was perhaps a *smaller rainfall* just in this section of the country than for any one year in the memory of the oldest inhabitant. It is doubted whether the ground was ever thoroughly wet from April, 1879, to January, 1880. A gentleman who had been observing the opening of a number of graves in the month of December informed me that he had never seen the earth so dry—even in any summer month. There was, therefore, great sluggishness in the streams and runs of the vicinity—even where they were not totally dried up. For similar reasons the sewers and gutters of the city could not be flushed, viz: on account of the scarcity of water and the necessity of economizing its use. There was on this account imperfect drainage both in the city and the surrounding country, and a great accumulation of garbage and other noxious stuff which is usually swept off by our rapidly flowing streams when flooded by storm-water. Though situate just at the head of tide-water, the land rises in the city and vicinity from 50 to 300 feet above the sea; and *per* consequence the streams—several of which pass through and around the city—have quite a fall and of course a rapid current. This gives us excellent natural drainage, and in heavy rains we usually get a good washing out. During the protracted drouth of the last year these natural advantages availed us nothing. But these accumulations from lack of drainage were not of a *vegetable* nature. On account of the want of moisture the ordinary luxuriant vegetation of our aluvial soil was lacking, and there was very little *vegetable mould* or decomposition. The noisome products which had been left to seethe and ferment by the dried and drying streams were rather of an *animal origin*. The ordure of more than twenty thousand people, the refuse and offal of half a dozen abattoirs, the garbage from the kitchen, cookshops and fish-stands—all contributed to the savory mass left to ferment in our midst and about us. Now, coincident with this condition of things, shall I say as a sequence there appeared this new form of fever, partaking more of the nature of typhoid fever than of malarious fever and yet not essentially either. In addition to these facts it is notable that there was almost a total absence of the usual climatic remittent and intermittent fevers. Indeed, so far as my own practice is concerned, I can say that not one uncomplicated case of simple intermittent fever was brought to my notice during the summer or autumn of 1879. In its place came this new evil—typho-malarial fever I suppose it must be called—originating perhaps in the infection begotten of undrained ditches, sewers and streams, and having implanted upon its nature the habit of periodicity which our malarial fevers have been establishing in the systems of our people for so many years.

Another circumstance favoring the supposition that a comparative dryness of soil is essential to the development or propagation of the typhoid cause is found in the connection between the prevalence of the disease and the level of the subsoil water. BUHL and PETTENKOFER have shown that in Munich typhoid increases as the water-level falls and decreases as it rises. VIRCHOW has demonstrated similar facts in Berlin. In this country H. B. BAKER of Michigan noted the condition of the water-level in connection with reports of typhoid received from his correspondents in various parts of the State during the years 1873-83. His investigations appear to demonstrate that a fall in the subsoil water-level, beginning usually in June and continuing until October, corresponds with a somewhat later

* *Typho-malarial Fever: Remarks on an Endemic Fever, 1879, in the City of Petersburg and vicinage.*—*Virginia Medical Monthly*, Vol. VII, p. 89 *et seq.*

but similarly progressive increase in the prevalence of typhoid, and that the subsequent rise of the water-level is followed by a diminished prevalence of the fever.*

The Munich observers suggested in explanation that the matter which, by its fermentation, gives origin to the causes of typhoid, lies deep in the earth and undergoes fermentation only when freed from excess of moisture by the fall of the subsoil water-level. LIEBERMEISTER regards the increased prevalence associated with low water in the wells as due to a concentration of the infective matter resulting from the increased area of drainage and the diminished quantity of diluting water.† BAKER holds in a similar manner that the specific poison of typhoid fever from neighboring privies and infected soil is more likely to enter the wells when the water is low. He, however, announces that in Michigan the law of correspondence, as formulated by BUHL and PETTENKOFER, does not hold good during the winter: "Typhoid fever follows *low* water in summer and *high* water at that season of the year when the ground is usually thoroughly frozen."‡

The proposition that water percolating through a soil contaminated with the specific germ or cause of typhoid fever may carry the infective principle into wells and springs appears to be definitely established. The Lausen epidemic has shown that filtration through the soil is incompetent to remove the cause of typhoid fever from water.§ Again, the proposition that a well or spring infected in this manner is more dangerous when it contains little than when it contains much water, is highly probable. But neither of these propositions excludes the possibility of the fever originating independently of germs that have had a previous habitat in the human system; nor do they demonstrate that the causes of

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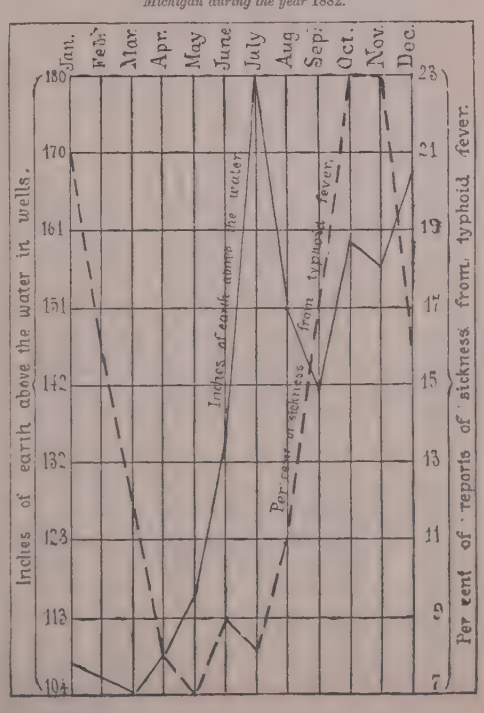
* *Typhoid Fever and Low Water in Wells.*—See *Annual Report State Board of Health of Michigan for* 1884, or *Reports and Papers of the American Public Health Association*, Vol. XII.

† See American Translation *Ziemssen's Cyclop.*, Vol. I, p. 71.

‡ The year 1882 furnished Dr. BAKER with his most notable illustration of high-ground water corresponding with a considerable prevalence of fever in the winter season. It is noticeable, however, that in his diagram for the year mentioned the increased movement of the fever followed the lowering of the subsoil water-level so slowly that, although the lowest level was noted in July, the maximum of prevalence was not attained until October. The high rate of prevalence in January may not therefore be compared with the high-water level of the same month, but with the level of one of the later months of 1881. What this may have been is not known; for since the wells examined were not the same wells in both years, "no comparison," as Dr. BAKER points out, "can be made of one year with the other as to the exact height of the water during the year as a whole or of one month with the corresponding month in another year." The high-water level in the wells observed in 1881 was 160 inches below the surface; the low level 256 inches. The highest level in 1882 was 104 inches, the lowest 180 inches. But as the frequency of typhoid in both years was determined in the same manner, the rates prevailing in the spring of 1882 are susceptible of comparison with those of the preceding winter; and these show a gradual decrease from 37 per cent. of the reports furnished in October, 1881, to 32 in November, 25 in December, 21 in January of the following year, 16 in February, 12 in March, 8 in April and 7, the minimum, in May. As the general tendency of Dr. BAKER'S researches favors the establishment of a relationship between high water and diminished prevalence, it seems likely that this gradual decline in the fever-rate was preceded by a correlated movement of the level, even although high water was in this instance associated with a high prevalence of the fever. It may also be pointed out that if Dr. BAKER be warranted in inferring a connection between high water and increased prevalence in January and February, 1882, the connection between low water and diminished prevalence in July would be equally authorized; but this last is opposed to the general tenor of the observations. There appears, however, in some of his diagrams a slight want of that correspondence between the water-level and the prevalence of typhoid that is known to exist during the summer and autumn. When the ground is frozen the privies and other sources of typhoid contamination are also frozen; the water-level is low in the absence of percolation from the surface, and typhoid fever is at a minimum. When, on the other hand, in the cold months the ground is not bound up by frost and percolation from the surface is unimpeded, the water-level may rise, and this rise be followed by an increase of typhoid rather than a decrease.

§ See *supra*, note *, page 494.

DIAGRAM *showing the relation between the height of the subsoil water-level and the prevalence of typhoid fever in the State of Michigan during the year* 1882.



typhoid lie so deep in the ground as to be incapable of reaching the system except by the water-supply. The only deduction allowable from many of the experiences on which they are based is that a certain dryness of some layer of the subsoil overlying the water-level is needful to the development of the cause. Whether this layer be deep or superficial has not been demonstrated, but so far as the evidence goes it is apparently rather superficial than deep. A certain amount of moisture is necessary to the production of malaria. Typhoid follows malarial diseases so promptly in some instances, that the symptoms of both diseases may be developed coincidentally in the same person. This absence of interval indicates that the superficial layers of the soil, or those incompetent to evolve malaria on account of their dryness, are the site whence the typhoid germ is evolved.

Liebermeister takes occasion to remind us that in discussing the influence of low water in wells the influence of season must not be forgotten. The summer heats certainly lower the subsoil water-level, and are known to be favorable to fermentative processes. Both of these effects may be assumed not only to increase the virulence of a water-supply derived from an infected area of drainage, but to favor the development and evolution of the typhoid miasm from a suitably dry and otherwise congenial soil. But as all works of improvement, engineering, agricultural or civic, which lower the level of the subsoil water, promote the disappearance of malarial fevers and the subsequent appearance of typhoid cases, the proper condition of the soil as to moisture seems, under ordinary ranges of temperature, to be the determining influence in the evolution of the typhoid cause. The lowering of the water-level in wells is a coincidence, but not an essential of the prevalence of typhoid fever, although it may aid in the propagation of the disease by concentrating a percolated infection or miasm in the drinking-water.

Besides a certain dryness of soil and a temperature suitable for fermentative processes, nutritive material of an organic nature seems to be requisite for the development of the miasm or germ. Formerly animal matter was considered essential—an opinion originating no doubt in the general acceptance of Budd's theory of propagation from intestine to intestine, or of Murchison's pythogenesis,—but the evidence certainly favors the belief that vegetable matter affords a congenial soil for the increase of the typhoid cause; and some of the instances seem to indicate that to be effective the quality of this need not be such as to constitute filthy surroundings in the ordinary acceptation of this phrase.

From the considerations involved in the above inquiry it seems probable that typhoid fever is a miasmatic disease arising from the concurrence of certain conditions of the soil, and propagated as well by indirect and perhaps direct contagion as by purely telluric exhalations and percolations, contaminating air and water with the specific poison or germ. If we assume the disease to be miasmatic-contagious in this view of the meaning of the compound term, the probable origin and mode of propagation of an outbreak in civil life may in many instances be determined. In country districts the normal environment of the sufferers is well known, and the unusual, among which are the typhogenic, conditions may be studied with proportionate facility. In large cities, where the environment is complicated, the origin of local epidemics is necessarily involved in corresponding obscurity. In an army the difficulties attending an investigation into the causation and transmission of typhoid fever are increased by the possible existence of unknown and unsuspected factors. To these difficulties may be attributed the absence of special reports on its causation in our camps.

Notwithstanding the great prevalence of typhoid fever reported by our medical officers

during the first year of the war the epidemic was never general. It consisted of a series of local or regimental outbreaks. One regiment suffered while that encamped in an adjacent field was unaffected, although the shelter, duties, diet, water and soil were to all appearances of the same character in both instances. One regiment suffered severely—a second was affected to a less extent—and in both the rapid sequence of the cases indicated a local epidemic; but in a third command the cases were scattered over a longer period and a typhoid epidemic was not recognized. The surroundings of each regiment were subject to constant change,—by the general movements of the army, by the special movements of individual detachments in compliance with orders assigning them to various duties within the lines of the army, and by transfer to distant military commands. A close study of the medical history of each regiment is essential to a knowledge of the typhoid epidemics of the war; but the materials for this have not been furnished.

Nevertheless, from what has been already submitted, the appearance of the disease in a regiment or other unit of military organization may be granted as having been due in some cases to importation from the localities in which the command was recruited; in others to camping on ground infected by its former occupants; in others again, to miasmatic influences affecting the air or water, encountered amid the changeful conditions of field service and due to a dryness of soil inconsistent with the development of unmodified malarial fevers. Generally this condition of the soil as to moisture depended on its porosity and on ordinary meteorological influences; sometimes, however, it was produced artificially, as when the subsoil water-level was lowered by the work of military engineers; even the means adopted by the men to make themselves comfortable in field-quarters were frequently the cause of small local outbreaks, which assumed the proportions of an epidemic when multiplied by a multiplication of the causes. In view of the miasmatic origin of typhoid, the huts constructed by the troops in the early part of the war afforded all the elements needful to its production. The shelter-canvas was pitched over low walls built of logs; the ground around the walls was trenched to keep the floor dry, and the earth removed from the trenches was banked up on the exterior of the logs to close up the crevices. Organic additions were made to the soil forming the floor of the hut by crumbs and scraps incidental to the messing of several men in this confined space. Heat only was required for the fermentation of the soil, and this was afforded by the fire built for interior warmth. The external cold prevented emanations from the camp-site as a whole, but each tent or hut became a hotbed for the development of the typhoid miasm—in small quantities, no doubt—but in a high state of concentration; for the energies of the occupants were devoted rather to excluding the cold than to ventilating their quarters.* Many medical officers were active in their endeavors to suppress fever in their commands by destroying these hotbeds or by diluting and dissipating their emanations.

Probably in no instance that occurred during the war could a miasmatic origin of the

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M. [illegible]—*Le* [illegible], Paris, 1878, pp. [illegible]—cited as the spontaneous origin of typhoid established by instances [illegible]. Here is the statement in full: "When a number of persons coming from a perfectly salubrious locality, i. e., [illegible] of typhoid fever in the town, are collected for a time within a small and new premises, but are protected at the same time from the [illegible] of any severe endemic of a general character, typhoid fever, should it make its appearance among them, must be held to have originated [illegible]." He applies this to a certain portion of the [illegible] and Battalion of Chasseurs. This corps was sent from Limoges to Bellac [illegible], 1870. Previous statistics showing little sickness while the troops were garrisoned. As some of the barracks in preparation, for the troops were finished, 160 men were quartered in three confined rooms, each of which had but two windows and no ventilating shaft. The [illegible] [illegible] 720 cubic feet. Bad weather confined the men to their quarters even during the day, and caused them to stuff up [illegible] apertures that would have given entrance to air. From February 21 to March 25 typhoid fever attacked 18 men, one of whom died. The water-supply, although impure, was unconnected with the outbreak, for the non-commissioned officers and others belonging to the command, who had [illegible] quarters, were unaffected. M. Du Cazal, who reported the outbreak, referred it to infection of the air by organic emanations from the human body—[illegible]—and M. Colin concurs in this explanation.

fever be demonstrated. Instances in which no other origin could be indicated may not have been uncommon, but the many and varying exposures to which the individual or the command might have been subjected, unknown to the regimental medical officers, invalidate all conclusions reached by the method of exclusion. Nevertheless the striking illustration furnished by the experience of Ass't Surgeon McELDERRY, in the Modoc campaign, shows that typhoid of a purely miasmatic origin may have been frequently present during the war, since the conditions that developed the disease in Company G, 12th U. S. Infantry, in Oregon, were of common occurrence among our volunteer troops.

By recognizing as one cause of enteric fever a telluric germ capable of naturalization in the human system and of indirect, and perhaps direct, transmission from person to person, the existence of the specific disease may be acknowledged in cases where, on other theories, a malarial fever only could be allowed as present. The prompt acceptance of the term typho-malarial by a majority of the profession in this country, where, in our growing settlements, the condition of the subsoil as to moisture is such that malarial and typhoid conditions alternate, shows the tendency to avoid a diagnosis of typhoid when the previous case is wanting to account for the specific poison. Were these cases acknowledged as typhoid, and their infectious qualities allowed, disinfection of the intestinal excreta would be in order, with a consequent diminution of the prevalence of the disease. So long as they are regarded as malarial, because the connection with a previous case cannot be established, quinine will be administered as the one thing needful, the chambers, sinks, privies and sewers will become charged with the specific germ emanating from the obscure febrile case, and a local epidemic of a dangerous but preventable disease may be the consequence.

When the disease originated in miasmatic influences a violent but short-lived outbreak resulted; for although the whole of the men susceptible to the miasm may not have been directly affected by it, the large number of primary cases quickly established a focus of infection which threw its baleful influence over all the command, and perhaps beyond it, into neighboring camps, if prompt and effective measures were not taken to stamp out the disease. A similar rapidity characterized the outbreaks resulting from the occupation of localities infected by their previous occupants.

When the disease originated by direct or indirect contagion, affecting in the first instance one or at most few individuals, its progress was less rapid. Transmission from man to man through the medium of the sinks, close communication in quarters, infected blankets, etc., necessarily separated one case from its progeny by at least the period of incubation. The prompt removal of the cases from quarters to hospital, although primarily in the interest of the sick man, was practically an imperfect isolation which tended to confine the sphere of infection within limits under the special surveillance of the medical officers.

The water-supply, although frequently detected in transmitting the specific germ of typhoid in civil life, was seldom arraigned by our military surgeons except in the absence of other and more evident insanitary influences. In large and crowded camps it was impossible to preserve the streams from fæcal contamination. Every rainfall washed more or less of the filth of the camps into their current. Wells, also, were liable to become dangerous from typhogenic miasm or infection from a previous case. It may be assumed, therefore, that the water-supply was not unfrequently the vehicle of transmission and even of primary invasion.

The diet was sometimes included among the insanitary agencies tending to the devel-

opment of the fever, and at least two medical officers regarded it as the *primum mobile* of the disease.* But men became affected whether they were well or poorly fed, and of regiments on the same rations some were attacked while others escaped. The diet was apparently unconnected with the causation except in so far as a state of mal-nutrition may have increased the susceptibility of the individual to this as to other diseases by diminishing the resistance of his system to morbific influences.

Hardships, fatigues and exposure to the vicissitudes of the weather were often mentioned among the causative agencies, but their action was evidently of the indirect and general character attributed to an insufficient dietary.

Overcrowding was certainly unconnected with the causation of the disease. Of commands on similar areas some were scourged while others escaped visitation. The disease prevailed among troops stationed in barracks which gave a larger air-space per man to their occupants than was furnished by buildings of similar construction to troops who remained unaffected. Nevertheless, overcrowding was as certainly a chief factor in the propagation of the disease. Its importance in this respect cannot well be overestimated: It afforded facilities for every mode of transmission from man to man.—by the latrines, the wells, the infection of beds, bed-clothing, wearing apparel and other articles, and by direct contagion, if this last mode be allowed. Moreover, it increased the virulence of the disease and added proportionately to its fatality.—effects which were experienced also by the victims of other acute diseases, the most common of which were remittent and continued malarial fevers and pneumonia. Non-specific ochletic emanations by aggravating the disorder of the blood in typhoid intensified the cerebral symptoms and gave rise to cutaneous maculations by which the fever became confounded with typhus,† an error sustained for the time being by the actively contagious qualities which the disease apparently manifested.

But, aside from the essential miasm or infection, the principal element in determining the occurrence of a regimental epidemic was without doubt the presence of a susceptibility to the disease on the part of the members of the command. This is demonstrated by the accessions of fever which were associated with the advent of new and so-called unseasoned men and the decrease of the disease as these men became converted into veteran soldiers: by the freedom of the old regiments of the regular army from typhoid, as compared with its prevalence in new regiments, whether regulars or volunteers: and by observations showing that troops recruited in cities where typhoid is endemic were less susceptible than those raised in country districts where the disease is relatively less frequent. As a matter of fact, the extent of the epidemic, other things being equal, depended, as in the eruptive fevers, on the number of susceptible individuals in the command.

This inherent susceptibility, so far as is known, can be exhausted only by an attack of the disease. A gradual exposure of the system to the causative agencies of typhoid is assumed by many to give a certain amount of protection, or to inure the individual to the morbific presence; but there is no valid ground for assuming that anything more is proved than that the susceptibility of the individual was not originally of a high order, or that it had already been exhausted by an attack of the disease.

That which is true of the individual may be predicated in a general way of the assemblage of individuals: Regiments have a susceptibility which is destroyed only by a thorough

* See note †, page 485, and report of Surgeon Beck, page 480, *supra*.

† See *supra*, page 456.

exposure to the typhoid germ; but it does not follow that every regiment must undergo an epidemic visitation.

Although medical officers can do much to prevent the occurrence of first cases, it is impossible for them to be always or even often successful. The known channels of attack during active service are too numerous to be effectively guarded; and, moreover, until the conditions of miasmatic evolution are ascertained with precision no exercise of care or caution can guarantee protection against its occasional manifestations, although, with the co-operation of commanding officers, the attack may be prevented from assuming the proportions of an epidemic. This may not be possible where a general miasm prevails, as when the soil, barracks or other quarters have been highly infected by previous cases, or when the morbific cause has operated through the water-supply. In such instances the immediate abandonment of the infected locality and the separation of the sick from the well are imperatively required to check the progress of the epidemic.

When, however, the primary cases are few in number and depend on importation or individual exposure in infected localities, an epidemic may be avoided, irrespective of susceptibility, by measures of general sanitation in camp and the prompt removal of the patients to a hospital where ample space, strict attention to cleanliness and the disinfection of stools and contaminated bed- and body-clothing will limit the spread of the disease. General sanitary measures not only destroy epidemicity but exercise a powerful influence in moderating the intensity of the typhoid phenomena in individual cases; they may even prevent the primary development of the fever by removing such local sources of typhoid miasm as may have existed in certain tents, huts or barracks.

The direct miasmatic derivation of typhoid prepares us for the occurrence of the disease in susceptible regiments, notwithstanding all care in the hygienic government of their camp; but this is no reason why such care should not be exercised. Proper construction and ventilation of the huts, ample space, purity of soil and care that neither the water nor the air of the camp be contaminated by its refuse, will often prevent the introduction and always limit the spread of typhoid fever as a camp disease.

III.—CONTINUED MALARIAL FEVER.

It is unnecessary to do more than mention the continued malarial fevers in this place; their miasmatic cause, a specific malaria, has already been discussed, together with their complication by adynamic or typhoid symptoms resulting from disorganization of the blood by typhogenic influences.

IV.—TYPHO-MALARIAL FEVER.

Nor, after what has been said on the subject of typhoid, is it needful to dwell at length on the causation of the true typho-malarial fevers,—an exposure to the co-existing miasms of typhoid fever and malarial disease, as when the pregnant soil is in transition between the comparatively moist state essential to the production of the latter and the comparatively dry state apparently as essential to the former, or the exposure to the typhoid cause of an individual already under the influence of the malarial miasm. But a few remarks on typho-malarial fever, as presented to the profession by medical writers and teachers since the close of the war, may not be out of place in this history. In truth, the literature that has crystalized around this term may be regarded as a medical product of the war of the rebellion.

At the close of their service the medical officers of our volunteer armies returned to the duties of civil life carrying with them an enlarged experience of fevers, together with the use of the term typho-malarial. The effort made in this volume to estimate the current value of this term during the period of the war has shown that clinically it was involved in uncertainties and obscurities which were increased and intensified by the ambiguity of its pathological meaning. Clinically it embraced, or was at liberty to embrace, all the continued fevers of our camps excepting such as were examples of what may be called text-book typhoid, for all deviations from a typical course might be regarded as modifications by the ever-present malaria. It embraced also all febrile manifestations resulting from the malarial miasm when upon these supervened the low or typhoid condition dependent on the retention in the blood of the products of tissue-waste. The aggregation of many of these purely malarial cases under the typho-malarial heading gave to the so-called fever a rate of fatality inconsistent with the presence of a specific typhoid element. This satisfied those who reported their adynamic remittents under the new heading that they were correct, or at least by no means alone in their method of classification, and obliged those who claimed the presence of a specific typhoid in all the reported typho-malarial cases to fall back upon a favorable influence exerted on the typhoid element by the co-existence of the malarial poison. In fact, as the name scarlatina indicates to the popular ear a much less dreaded enemy than scarlet fever, so to many who examined the reported figures without considering the facts represented by them, the term typho-malarial became a euphonious appellation in which the gravity of typhoid was comparatively dissipated.

In the absence of instructions concerning the pathological conditions characteristic of typho-malarial fever, cases presenting typhoid impaction or ulceration of the patches of Peyer and solitary glands, as well as those free from such lesions, were necessarily included under the title. This period of uncertainty as to the pathological value of the ambiguous term lasted for more than a year. Indeed, it may be said that no guide or guard for its use was at any time announced to the medical officers of the army; for although Dr. WOODWARD published his view of the meaning intended to be attached to it fourteen months after its introduction, the publication was incidental and evidently not specially intended to invite attention to probable errors of diagnosis. It may be assumed, however, that this incidental reference, or the volume on *Camp Diseases*, issued shortly afterwards, succeeded in reaching some of the reporters on account of the increased fatality-rate of the fever subsequent to the date of these publications.* Nevertheless, it may be considered a fact that the majority of our medical men left the service for civil duties with as much uncertainty concerning typho-malarial fever, clinically and pathologically, as when the term was first introduced.

Soon afterwards the profession in civil life appreciated the labor-saving value of the title, and typho-malarial fever became common in the health reports of cities and towns and in the private practice of physicians where formerly only common continued, typhoid and malarial fevers were known. We may assume that the errors of diagnosis, and doubt as to pathology, which vitiated the army statistics were propagated with the term and operated to create confusion of ideas among the profession in civil life. The lack of clinical records illustrative of the typho-malarial fever of the war† may be attributed only to the generally

* See Table XLII, p. 194, *supra*. During the fourteen months mentioned in the text 27,399 cases were reported among the white troops, with 1,585 deaths, equalling 5.79 per cent. of fatality; during the remainder of the period covered by the statistics of the war 22,472 cases were reported with 2,474 deaths, or 11.01 per cent.

† See page 212, *supra*.

felt uncertainty as to what really constituted the fever in question. A similar dearth of cases in the medical journals after the war may be explained in like manner. Dr. WOODWARD held the whole matter in hand, and to him the profession looked for enlightenment. This was given in a paper read in the section of medicine of the International Medical Congress held at Philadelphia in 1876. This achieved a wide circulation, and, as might have been expected, did much to clear away the mists of the typho-malarial atmosphere. But inasmuch as this author failed to appreciate the influence of a continued malarial fever in the evolution of typhoid symptoms, he was obliged to recognize a specific typhoid element where there was no *post-mortem* evidence of its presence.* The group of febrile cases which in this volume has, for reasons assigned, been set down as continued malarial, was regarded by him as typho-malarial, and constituted his first group of typho-malarial cases,—fevers in which the malarial element, without being the only pathological condition present, is the predominant one. This complication of the typho-malarial series with cases which presented neither clinical nor anatomical evidence of the presence of a specific typhoid fever has permitted a continuance, even to the present time, of much of the obscurity in which typho-malarial fever had been enveloped.

Before the introduction of the term the association of typhoid symptoms with malarial fever and of malarial symptoms with typhoid fever was well recognized.

Dr. W. L. FELDER, of Sumter District, S. C., described† a form of fever which, originally intermittent or remittent, lapsed into typhoid, this latter becoming complicated with swelling and suppuration of the parotid glands.

In the report of a committee on the diseases of Missouri and Iowa‡ we find:

The term typhoid is also sometimes applied to designate the terminal stage of an autumnal endemic fever of a periodic type, in which the distinct paroxysmal type becomes ultimately absorbed or lost in the continued febrile movements established by the supervention of acute or subacute inflammatory lesions, with nervous lesions terminating the pathological rôle.

Dr. S. H. DICKSON,§ Charleston, S. C., considers it a matter of familiar remark that in long protracted cases of the ordinary remittent of malarious regions there is a diminution or shading down of the palpable contrasts and alternations of the periods of febrile exacerbation and remission; a tendency in the former to continuousness, the latter exhibiting less alleviation of symptoms, and the whole appearance approaching that met with in continued fever, simple, nervous or typhoid. In common professional parlance such cases "take on the typhoid character."

Typhoid fever, says ELISHA BARTLETT,‖ like all other continued affections, is sometimes more or less mixed up with and influenced by the pathological element of periodicity. This will happen most frequently and will be most strongly marked in malarious regions and during the prevalence of remittent and intermittent fever. He cites Dr. WOOTEN, of Lowndesboro', Ala., as follows: "I may remark that I have often seen typhoid fever complicated with regular remittence—that is, typhoid fever and remittent fever existing together; and I have cured the paroxysmal exacerbations whilst the disease essential to typhoid fever continued; and I have frequently found it necessary to do this before the more formidable disease could be influenced by remedies. I have seen such cases in the practice of physicians who supposed them to be remittent or bilious fevers, in which the bowels had become diseased as a consequence of the fever. I think this is a very common error. The malarial influence frequently so predominates in the symptoms of inflammatory disease in our latitude as to obscure the real disease for many days; and in such cases it is easy to look upon such influence as the cause of the structural lesion, whilst in fact the latter has acted as the exciting cause to the manifestations of the former."

It is interesting to observe, as part of the history of this typho-malarial epoch of the literature of the continued fevers, that in the early part of the war, before the term became an official designation, Dr. JAS. J. LEVICK of the Pennsylvania hospital described, in one of his clinical lectures, a series of cases identical with those afterward correctly regarded as typho-malarial.¶ These he called *miasmatic typhoid fever*, and to them he invited special attention, as he believed that this mixed fever was of frequent occurrence at that time among

* See page 402, *supra*.
† *Trans. Amer. Med. Association*, Vol. V, 1852, p. 361.
‡ *Idem*, Vol. VIII, 1855, p. 106.
§ *Idem*, Vol. V, 1852, p. 141.
‖ *The History, Diagnosis and Treatment of the Fevers of the United States*, Phila., 1847, p. 127.
¶ *Miasmatic Typhoid Fever,—Med. and Surg. Reporter*, Phila., June 21, 1862, also *American Jour. Med. Sciences*, Vol. XLVII, 1864, p. 404 *et seq.*

our troops in the field. He considered that the two complaints coexisted in their essential natures and ran their course together without losing their individual characteristics. His description of typho-malarial fever agrees very closely with that afterwards given by Dr. WOODWARD in his volume on the Camp Diseases of the U. S. Army.

After the introduction of the term its restriction to cases in which the poisons of both malarial and typhoid fevers were present was insisted on by many observers.

Dr. AUSTIN FLINT says* typho-malarial fever is caused by the combined action of malaria and the special cause of typhoid fever. Practitioners in malarious situations have been accustomed to say that remittent becomes converted into typhoid fever. This mode of expression is not accurate; there is not a metamorphosis of the one disease into the other, but a combination of both diseases, the phenomena of the one or the other disease predominating in different cases.

Dr. ALONZO CLARK† has accepted the term typho-malarial as indicating the result in the human system of the conjoint operation of the poisons of malarial and typhoid or typhus fevers. He gives as an example a case of typhus in which intermitting coma was removed by the use of quinine. "Symptoms as severe as this do not commonly appear in typho-malarial fever, but accessions of fever are very apt to correspond with the accessions in the intermittent and remittent fevers—that is, the highest temperature is more apt to be present in the morning than in the evening."

In a recent medical journal we find:

I have met with many cases this season which commenced with a chill every afternoon, followed by a temperature of 104° and 105° in the evening. The next morning it would be normal. And with all the anti-malarial remedies used the chills would continue for ten days or more, when they would gradually cease and the fever become continuous, with all the symptoms of typhoid fever, even the rose-colored spots, bronchial trouble, tympanites and diarrhœa. Some cases would start as remittents and end with all the typhoid symptoms. To call such cases pernicious intermittents or remittents is nonsense. When a case of intermittent or remittent fever does not yield to full doses of quinia, repeated for three or four days, you generally have the typhoid combination.‡

Similar ideas are found in recent English literature:

There seems no doubt that there occur epidemics of fevers partaking of the nature of typhoid and of truly malarial intermittent or remittent fevers. This typho-malarial fever seems chiefly to originate and spread in regions where the poisons of both types of fever coexist—as in swampy regions in which the soil and water are largely impregnated with decomposing organic matter of both vegetable and animal origin. In ill-drained marshy regions in proximity to human habitations much animal refuse matter tends to accumulate and undergo decomposition simultaneously with the vegetable matter of the swamp. We find that in such regions ague and typhoid are, ordinarily, both prevalent.§

But various other views have been expressed, from a weak denial of the existence of a typho-malarial fever to the recognition of a typho-malarial miasm, both as a hybrid from typhoid and malarial factors and as *sui generis* or of telluric evolution independent of typhoid or malarial causes.

ROBERTS BARTHOLOW‖ doubts the existence of a typhoid fever modified in its progress by a malarial fever. He attributes the frequency of the typho-malarial diagnosis by the profession to errors arising from a want of appreciation of the remissions in the stages of accession and subsidence of ordinary typhoid and from a want of recognition of the antipyretic influence of large doses of quinine in this disease. He believes that there exists such an antagonism between the two that in the presence of the typhoid poison the malarial poison ceases to be active. He had held that the thermal line of typhoid might receive an impression from a coexisting malarial complication, but in the light of a wider experience he concludes that the modification in the thermal line, supposed to be due to malarial complication, has for the most part no real existence. In chronic malarial poisoning the malarial influence is insufficient to modify the typhoid process to any appreciable extent; but where the malarial infection is active its manifestations cease during the typhoid progress, to become again prominent as an intermittent during the progress of convalescence.

J. S. CAULKINS,¶ of Thornville, Mich., argues that typho-malarial fever is a distinct disease, propagated by its own special cause, and that this special cause is a hybrid or fertile cross between marsh miasm and the typhoid-fever poison. He infers that these morbific agencies are nearly related saprophytes, probably varieties of one species, or at the farthest species conforming closely to a common type, because the progeny of parents more remotely connected is incapable of propagating the cross, which perishes with the first generation. Cases last usually about four weeks. At first, in some instances, a redness of the tip and edges of the tongue may be suggestive of the future progress of

* *Principles and Practice of Medicine*, New York, 1873, p. 937.
† *Medical Record*, Vol. XIII, New York, 1878, p. 304.
‡ Dr. W. F. SMITH, *Med. and Surg. Reporter*, Philadelphia, Pa., 1882, Vol. XLVI, p. 167.
§ Surgeon E. G. RUSSELL, Bengal Med. Service,—*Malaria, its Cause and Effect*, Calcutta, 1880, p. 92.
‖ See his paper *On Typho-malarial Fever, Medical News*, Vol. XLV, Phila., 1884, p. 281.
¶ *Detroit Lancet*, Vol. I, 1878, p. 403.

the disease; in others the tongue is pale and coated with a bilious-looking fur. The intermissions may be so distinct that the case is regarded as an ordinary ague; but the febrile action becomes continuous, and in the second week enteric symptoms are developed. He gives notes of one case and briefly refers to five others. In the case noted there were recurring chills with nausea and vomiting, fever and profuse sweats. In the second week the patient seemed much improved and was able to be up and walk about, but his appetite did not return, his tongue continued smooth and red and he perspired profusely at night. In the third week a relapse occurred with nausea, vomiting and chills as at first. Diarrhœa followed the administration of castor oil. Improvement was gradual; even at the end of the fifth week the evening temperature was 100° Fahr. and perspirations occurred nightly. No cerebral symptoms were present: no rose-colored spots are mentioned as having been seen.

W. C. JARNAGIN,* Macon, Miss., takes a chemical view of this subject. He considers that the specific poison which produces typho-malarial fever is distinct in its individuality, and argues that since we are ignorant of the nature of the typhoid or malarial poison there is nothing left for us but to approximate the truth "by reasoning from the visible and tangible effects through the conditions requisite for the development of those poisons to their nature." He is thus led to believe them gaseous; but as he knows of nothing in nature that has not a chemical existence and is not controlled by definite chemical laws, the separate and distinct septic poison which, under favorable anti-hygienic conditions gives rise to typho-malarial fever, must naturally be the product of the chemical combination of the gaseous poisons of typhoid and malarial fevers.

J. H. CARSTENS,† Detroit, Mich., holds that this fever is *sui generis* and to be distinguished from typhoid, intermittent and remittent fevers. After a few days of malaise there is a chill followed by high fever, the temperature remaining thereafter at 103° to 105° Fahr., and the evening observations being sometimes a little higher than those taken in the morning. The sudden development of the febrile condition excludes typhoid fever; continuance of the high temperature excludes remittent fever. Among other diagnostic signs are mentioned the pulse, which is rapid, 120 to 140, small and quick; delirium present from the very first night, and the occasional appearance of purpuric spots; rose-colored spots do not appear. The anatomical changes are said to be almost pathognomonic, consisting of enlargement of the solitary follicles of the small intestine with deposit of pigment in them and sometimes ulceration of their apices, Peyer's patches being unaltered or merely congested.

An association or combination of the malarial miasm with a septic poison, not that of typhoid, is invoked by some writers to account for the existence of typho-malarial fever.

HENRY WORTHINGTON,‡ Los Angeles, Cal., says that the morbific principle is not identical with the typhoid material of the pythogenic disease, but rests upon a double animal and vegetable basis, a combination of septic and malarial elements. He gives the following account of the symptoms. The patients suffered from the remittent type of fever in the beginning, which gradually became continued. A characteristic group of symptoms was present such as dry tongue, cough with expectoration, usually vomiting, inconsiderable iliac tenderness and tympany; in one case diarrhœa, in one constipation and in a third slight hemorrhage from the bowels. They sank into an apathetic condition with delirious muttering and in one case extreme jactitation, involuntary evacuations and the hippocratic expression. He gives as follows the results of *post-mortem* examination in three cases: *First case.* Brain anæmic; lungs congested and splenified posteriorly; heart soft and flabby; mucous membrane of stomach red and softened; spleen enlarged and easily torn; liver enlarged and brown; kidneys congested; mucous membrane of intestines intensely pigmented throughout, near ileo-cæcal valve several small ulcers with inverted edges; Peyer's patches and mesenteric glands unchanged; bladder softened and containing fetid urine. *Second case.* Brain normal; lungs hyperæmic by hypostasis; heart pale and easily torn, mucous membrane of stomach reddened; spleen soft and enlarged; liver hypertrophied and brown; kidneys enlarged and hyperæmic; mucous membrane of intestines engorged and stained with pigmentary matter, mesenteric glands slightly swollen; Peyer's patches unchanged; bladder softened and very pale. *Third case.* Brain healthy; lungs congested, consolidated and pigmented; heart flaccid and pale; stomach healthy; spleen enlarged, its trabeculæ easily broken down; liver congested; kidneys enlarged and the seat of small infarctions; mucous membrane of intestines swollen and red; mesenteric glands swollen; Brünner's glands enlarged and congested; bladder normal.

L. A. SNIDER,§ Sacramento, Cal., in a paper on an epidemic in that city, announces that the disease is developed from the combined influence of a malarial and septic poison arising from sewer gas and wholly independent of a specific typhoid germ or other morbific agent derived from a diseased organization; but he gives none of the experiences or arguments on which his belief is formed.

A. L. LOOMIS‖ has systematized this idea of a septic poison, and suppressing the term *typho-malarial*, has aggregated the cases supposed by him to be due to the septic and malarial combination under the heading of *Continued Malarial Fever*. Here he places those malarial fevers of continued type that have no claim to typho-malarial characteristics except that clinically they present the typhoid signs attending a non-specific deterioration of the blood. These are his cases in which the *malarial* element predominates. Here also

* *St. Louis Courier of Medicine and Collateral Sciences*, Vol. III, 1880, p. 335.
† *Detroit Clinic*, Vol. I, 1882, p. 7.
‡ *New York Medical Record*, Vol. XIV, 1878, p. 83.
§ *Pacific Med. and Surg. Jour.*, Vol. XXIII, 1880-'81, pp. 248 *et seq.*
‖ *A Text-Book of Practical Medicine*, New York, 1884, pp. 826 *et seq.*

he places the true typho-malarial cases, they constituting his *septic* group of the continued malarial fevers. Having associated these essentially different sets of cases, he apparently assumes that what has been proved of one set is applicable to the other, arguing that because in the one the glands of Peyer are not ulcerated and no suspicion of contagion, direct or indirect, is apparent, there can be no typhoid in the other: and that since there is no typhoid in these, the ulcerations that look so like those of typhoid must be due to some other septic cause. Dr. LOOMIS, indeed, points out that there is little to distinguish these intestinal changes from those that are developed in typhoid fever except the tendency to the deposit of black pigment in the enlarged follicles: but he considers that this pigment is enough in itself to show that the disease depends on an essentially different exciting cause. It has already been shown in this discussion* that the presence of the pigment is susceptible of satisfactory explanation without calling in the aid of peculiar and unknown poisons.

M. LÉON COLIN has expressed the opinion that a real affiliation exists between typhoid and remittent fevers.†

Does the paludal typhoid fever of camps and marshy countries, arising outside of cities, and, hence, outside the principal typhogenic foci, depend on a coincidence of two morbid influences? We might have adopted this opinion if we had not extended our observations over a greater period than a year: but during the three summers **that we have observed the disease of the Roman Campagna we have always seen the typhoid fever break out in the** month of July, together with remittent fever of paludal origin, presenting from the first its maximum gravity, showing neither increase nor decrease, and attacking in preference those in whom the phenomena of remittent fever were most characteristic. If such associations periodically reappear at a time when telluric influences predominate, it follows that something more is required than coincidence of two different affections, and that there exists between them a **real affiliation.**‡

Although well versed in the characteristics of these fevers he found it impossible to distinguish during life between a so-called adynamic remittent and a typhoid fever complicated by an antecedent malarial influence. Often, when he believed the malady to be exclusively malarial, the typical typhoid fever lesions were found on *post-mortem* examination, and in other cases in which from the clinical appearances he regarded typhoid fever as certainly present, only the lesions of pernicious fever were discovered after death. He was therefore led to suggest an intimate relationship between the two fevers. He considered the typhoid fever in these instances due to the development of a predisposition in the human system, under the influence of a prolonged febrile movement, gastric troubles and altered secretions. In fact, he assumed that the malarial fever prepares the system for invasion by the telluric miasms which are the cause of typhoid fever, the former being thus a determining agent in the production of the latter. But he goes further. He believes that malarial fever can induce true typhoid by auto-infection, and in this way he explains the succession of typhoid to remittents not only in individuals but in districts. When a malarious section has been improved by drainage and made suitable for agriculture, immigration fills it with a class of people hitherto preserved from malarial and typhoid affections. Their predisposition to these diseases is strong and there is required only the malarial cause of a remittent fever to develop in them a true typhoid fever. Indeed his theory finds expression in the phrase popular in some parts of this country—"the fever turned into typhoid." There is, however, such essential differences between the natural history of the typhoid and the malarial poisons, differences which led BOUDIN to adopt the doctrine of a veritable antagonism between the diseases caused by them, that it is impossible to admit the development of the one from the other. On COLIN'S hypothesis typhoid fever should be more common where

* *Supra*, page 455.

† See his *Traité des Fièvres Intermittentes*, Paris, 1870, pp. 276 *et seq.*

‡ See *La Fievre Typhoïde dans l'Armée*, Paris, 1878, p. 155.

remittents prevail; but it is well known, on the contrary, to increase with their diminution. Typhoid *symptoms* are frequently associated with persisting remittents and continued malarial fevers, but these are unconnected with the anatomical lesion which indicates the presence of a true typhoid fever. From the invariable presence of this lesion in typhoid fever is inferred the action of a specific cause,—an inference sustained by our knowledge of its incubation in the system and its infectious qualities, and this is inconsistent with the idea of the development of the disease from a cause which ordinarily evolves a malady closely associated with the simple intermittents.

Another French writer, CORRE,* defines typho-malarial fevers as engendered under the combined influence of malarial and typhous conditions and presenting phenomena suggestive of the presence of both diseases. He divides them into three classes:

1. Typho-malarial by association, each of the two elements being present and producing its effects.
2. True typho-malarial fevers resulting from the operation of a single agent,—*typho-malaria* of external origin.
3. Typho-malarial fevers by transformation, in which in a malarial fever the typhoid condition is developed under the influence of an infection engendered in the system of the patient.

His first class comprises the true typho-malarial cases of the civil war; his third class the adynamic malarial cases. Our records give no evidence of the existence of cases such as are comprehended in his second class.

The medical journals do not contain many cases illustrative of typho-malarial fever. Nevertheless a few notes may be submitted to show the character of the cases reported under this heading. Some of these no doubt were truly cases of the associated diseases; others were remitting or continued malarial fever or other continued fever, not even excluding specific typhoid with or without typhoid symptoms. In fact, the same aggregation of cases of doubtful character that constituted the typho-malarial fevers of the war appear to have constituted the typho-malarial cases that have been reported since the war.

J. P. CHESNEY,† New Market, Platte County, Mo., refers to the ambiguity of the term typho-malarial, and states that in his part of the country its use is restricted to cases presenting "one or more symptoms common to each of the two fevers." This mixed form as well as uncomplicated typhoid is rare in his section. He gives a case to illustrate the Platte county use of the term. A man who had been living for some months in a highly malarious locality was seized July 10, 1869, with intermittent fever which was readily controlled. After this he was somewhat indisposed but able to attend to business until towards the end of the month, when he took to bed August 2. Dr. CHESNEY noted his condition as follows: "Dorsal decubitus, stupor, cutaneous surface presenting a sallow shriveled appearance, night sweats, great tenderness in the ileo-colic junction, diarrhœa, tongue dry, red and *peculiarly cylindrical* in form, cold extremities, dilated pupils and pulse 120 to the minute." On the 4th the patient was improving, but having been left unattended he went out to stool, and becoming bewildered among the tall grass and corn, wandered from midnight till day before he was found. He was completely exhausted, and died on the 6th.

Mr. C., a farmer; aged 42; married; came under the care of J. H. VAN EMAN,‡ of Toganoxie, Kans., Oct. 23, 1872. Three weeks prior to this date he had been taken with chills and fever, the latter soon becoming subcontinuous. Some medicine administered by his family physician set up violent catharsis accompanied with delirium, but the diarrhœa was speedily controlled. Delirium and sleeplessness had continued for six days, when VAN EMAN was called in. The patient's tongue was brown in the centre and red at the tip and edges; his eyes congested and the pupils somewhat contracted and sluggish; respiratory and percussion sounds normal; pulse 118 and rather feeble; bowels unmoved for twenty-four hours, tympanitic, tender and gurgling on pressure in the right iliac region; every few minutes the patient tried to get out of bed and out of the house, and when in a quieter mood worked his hands and fingers, picking constantly at the clothing. To promote sleep and restrain delirium a solution of ten grains of chloral and five of bromide of potassium was given occasionally; quinine in three-grain doses every two hours was also prescribed, with milk and beef-essence as nutriment. The tongue became very dry on the 26th; the quinine was reduced to two grains every four hours with small doses of turpentine emulsion. Next day his passages were involuntary, and during the following night he had an attack of violent delirium; but on the 30th the tongue began to clean, and on November 1 consciousness was restored. After this improvement was slow but uninterrupted. On December 10 the patient was considered well.

The experience of H. K. PUSEY,§ of Garnettsville, Ky., leads him to doubt the accuracy of the view that the

* A. CORRE—*Traité des fièvres bilieuses et typhiques des pays chauds*, Paris, 1883, p. 255.
† *Pacific Med. and Surg. Jour., N. S.*, Vol. III, p. 310.
‡ *Leavenworth Medical Herald*, Vol. VI, 1872–73, p. 85.
§ *Louisville Med. News*, 1878, p. 104.

typho-malarial fever which prevails in that section of the country is typhoid fever modified by a co-existing acute malarial attack. Finding that in many instances the disease is cut short by quinine, he considers himself justified in regarding it as being essentially malarial and having no specific typhoid element. He suggests the name of continued malarial fever as more appropriate and suggestive of correct principles of treatment.

R. P. Mabry,* Memphis, Tenn., in describing what he calls malarial continued fever, says: "Cases of this kind, or others referred to as 'neglected remittents,' and as 'remittents with adynamic tendencies'; and for several years past, so far as I can learn, this is the form of fever denominated in the mortality reports of this city 'typho-malarial.' * * * This term has been applied generally by our physicians to all the cases of continued fever because they were recognized as not being typhoid and were not treated upon its principles." His description of the disease is as follows: "In an acute manner of being attacked, as is the case with remittents, sometimes marked by prodromata. In many cases the patient has been ailing for a week before going to bed; in others he has had a repetition of chills for two or more weeks at irregular intervals, when finally the fever which follows the chill assumes a continued form and goes on rising gradually until the sixth or seventh day, when the temperature reaches 105° or 106°. This form presents a tendency of increase of about one week, a stadium of height of five or six days and a stadium of decrease which terminates completely on the twenty-first day. Its thermometric range is decidedly lower than that of typhoid, it seldom goes above 106°. Vomiting of bile is a common symptom during the first days of the attack; intestinal torpor is generally present; constipation and a tender abdomen are marked features; enlargement, splenic tenderness or enlargement has been so rare in his observation that from memory he can recall not a dozen in fifteen years. All the essential features of typhoid or enteric fever are absent. There is no diarrhœa, no abnormal conditions or gurgling on percussion, no symptoms of ulcerated spots, and as a rule there is an entire absence of pulmonary symptoms. But in some instances of severe cases in which the patient was unfavorably situated for treatment or had no treatment he has seen diarrhœa, dry red and shining tongue, sordes and low delirium, with pecking at the bedclothes and a condition closely resembling typhoid.

Surgeon C. H. Wurtz,† U. S. Army, considers the disease a compound fever, typhoid in form and malarial in character. He refers to an epidemic in the Sweet Water beginning by distinct chills, with repeated perfect intermissions. Although in some cases the chills were followed by symptoms of a low form of continued fever came on after an interval of three to seven days, accompanied by moderate delirium, loss of relish for food, little thirst but much heat of skin and derangement of the digestive organs: diarrhœa was not constantly present. * * * "During the past year I have noticed ulcerated patches in both small and large intestine; perhaps very few spots in the small intestine, and in the large intestine large and frequent ulcerations. I should not give this so important a place, but in consultation with Professor Loving of Columbus, a careful and conscientious observer of large experience, he states that he believes ulcerations of the large intestine to be a distinguishing mark of the disease, and exhibited specimens illustrating this pathological view."

J. M. Da Costa,‡ states that he does not regard the presence of enteric fever as an essential of the fever which he has described as typho-malarial. On the contrary, it may be doubted from his remarks that if the abdominal lesions of typhoid had been indicated by the symptoms, his diagnosis would have been typhoid and not typho-malarial fever. If the patient was a girl between eighteen years of age. "A week prior to her admission to the wards she was seized with fever, headache and pain in the back, stomach and left side. Her face too was flushed. The thermometer marked 103° on the evening of her admission. She began also to cough. The pain in her neck and the back of her head grew more intense. She also complained of cough and of pain in her left chest. There was no stiffness of the neck and none of the symptoms of cerebro-spinal meningitis. There was a slight amount of nausea and gastric uneasiness. As regards my diagnosis of the case the lateness and acute the fever appeared without cause, the headache and the age of the patient all pointed towards typhoid fever. On the second day after admission, however, I decided positively that it was not a case of typhoid fever, and this conclusion has been verified by the results. The symptoms which led me to exclude the diagnosis of typhoid fever were the extraordinary temperature record,—showing well marked continued and not remittent type. In the corresponding stage of typhoid fever such a state of affairs would be almost if not entirely unknown. On the morning of the second day of admission the temperature was 100°, on the third morning at 9 A.M. 99°, in the evening it again rose to 101°. For several days following there was a daily variation of from 2° to 3° between morning and evening temperature. On the 8th of the month the morning temperature was 97° and the evening temperature 102°. On the 10th the temperature had almost normal, with but very little variation between morning and evening figures. On the 12th, yesterday, I ordered the quinine to be stopped, as quinine does rapidly making its appearance. The patient had been taking a daily dose of sixteen grains of the drug. What treatment by tonics and general diet proved to be curative sometimes—that test was given at the height of the fever was the bath treated case, and second, that the latter case demonstrates the antipyretic by a case of malarial infection the temperature may run quite up again, although previously reduced to almost or the normal state. On the evening of the 13th the temperature was again at 103°. This morning the patient's temperature is 99° and her temperature 99°, but she is somewhat flushed. She is again under the influence of gelsemium having taken eight grains this morning. There is no enteric temperature and no eruption. The spleen is somewhat enlarged, extending an inch down, nearly an inch below the ribs. The area of liver dullness is but

* American Journal Medical Sciences, [ ] p. [illegible] ... of Medicine and Surgery, [illegible], p. 26.

† Malarial Fever, in the *Philadelphia Medical Times*, 1877.—Ib. p. 454. Dr. Da Costa, in a recent letter to the writer, ... into a continued fever of low type to which the term malario-typhoid fever might ... [illegible] ... typhoid fever, [illegible]

slightly increased below the margin of the ribs. There is a left basic, systolic blood-murmur to be distinguished over the heart."

Wm. H. Veatch,* of Pawnee, Sangamon County, Ill., arranges the cases of the typho-malarial epidemic of 1864 in his county into three classes. The first cases that came under his observation began as common remittents, but after three to seven days a typhoid character was assumed; death occurred or convalescence was established by the end of the second week. In others the remittent attack continued for eight or nine days without the appearance of typhoid symptoms, when, suddenly, a recurrence of chills would take place with an aggravation of the febrile condition, petechiæ, delirium, heavy perspirations, diarrhœa, collapse and death about the fifteenth day, if at this time a favorable change failed to make its appearance. In the third class the onset was gradual,—general indisposition, lasting from seven to fifteen days, was followed by chills, a febrile condition, diarrhœa, with a brown-coated tongue, red at the tip and edges, and congestion, perhaps even ulceration of the fauces; wild delirium supervened, followed by coma and speedy death, or, if stupor did not come on, the patient passed through a course of typhoid fever lasting from fifteen to forty-two days. In this class the typhoid symptoms appeared at various periods of the fever from the sixth to the twenty-sixth day, but in some cases it was not observed.

According to Dr. Claiborne the cases in the epidemic at Petersburg, Va., in 1879,† were always distinctly intermittent or remittent in their inception; but quinine did not exercise its ordinary antiperiodic effect. In three cases there was a cleaner tongue, less thirst, nausea, anorexia, debility and fever, fewer nervous symptoms and less delirium than in the typho-malarial fevers of the war; they lasted six, eight and ten weeks. The tongue became red and dry about the third week, but only in grave cases; diarrhœa was the exception, not the rule, and the rose-colored spots of undoubted typhoid were not present. But on the typhoid side there was in all cases some bleeding from the nose, sometimes only a few drops, sometimes more; and in most of the cases dulness of hearing, tinnitus aurium, the russet flush on the cheeks and abdominal tympanism; moreover, the disease occurred exclusively among young people and manifested a certain limited or quasi infectiousness. It was characterized by a high temperature, seldom less than 105° or 106° at 1 or 2 P. M.; the frequency of the pulse increased with the febrile exacerbation, but not in the same proportion, seldom rising above 100 or 110 per minute. Fatal cases usually terminated during the third week with wild delirium, acute mania, insomnia and convulsions, yet with recurring consciousness and without paralysis, showing the absence of organic lesions of the brain. No *post-mortem* observations were made.

D. W. Hand, St. Paul, Minn., gives a general description of typho-malarial fever as it is occasionally seen in St. Paul during the autumn along with ordinary remittent fevers, and as it occurred epidemically in the autumn of 1870.‡ It was distinguished from typhoid by its marked remittent form, the mildness or absence of delirium, the moist white condition of the tongue, the slight amount of intestinal irritation and tympanites and the early period at which convalescence frequently began; nevertheless the symptoms at first were much like those of typhoid. The chill was often unobserved and the attention first arrested by sudden loss of appetite and strength, violent head-pain and decided fever in the afternoon and evening. In some cases a bilious diarrhœa was developed; in others constipation, which did not yield readily to cathartics. The tongue, which was pale and round, usually remained coated with white fur throughout the disease. The stomach was generally irritable, and in many cases there was distressing vomiting. The pulse was from 90 to 120 and not usually very feeble. In all cases the temperature was largely increased, varying from 102° to 105½° Fahr.; indeed, most cases showed a temperature of 104° to 105° every evening for a week or ten days; the morning temperature was usually 1° to 1¼° lower than that of the evening. During the first three or four days the throat was sore, sometimes showing a diphtheritic exudation; and in a few cases a rash like that of measles appeared during the first week. Epistaxis sometimes occurred and the hearing became impaired. During the second week a bronchitic cough was invariably developed. There was generally some abdominal tenderness, but tympanites was rarely marked and diarrhœa, if present, was usually easily controlled. Sordes seldom appeared and the tongue rarely became dry or rough. After the early headache passed off the mind usually remained clear, although the patient was frequently rather dull and the countenance heavy; delirium, if present, was mild. Rose-colored spots were seen in very few cases, although carefully looked for; sudamina were common. Convalescence often began in the first or second week, although the fever lasted three weeks. Profuse night-sweats were common during convalescence. Dr. Hand saw at least one hundred cases during the epidemic and only three of these died. The disease was widespread, but the reports of the city health officer showed only five deaths attributed to it; perhaps, however, many of those reported due to typhoid should have been placed to the account of the typho-malarial epidemic. No *post-mortem* examinations were made.

J. A. Porter,§ Jackson, Mich., states that an endemic fever prevailed in the counties of Jackson and Lenawee in the summer and autumn of 1873, and that while the disease was regarded differently by various practitioners, some terming it cerebro-spinal meningitis, some remittent fever and some typhoid fever, he with others called it typho-malarial fever. He gives two cases to illustrate his general description. The attack began in various ways. Sometimes the patient was seized with a severe pain in the left shoulder, extending up the back of the neck, or in the arm or leg, with hyperæsthesia and febrile action; in others the febrile attack was preceded by a period of general indisposition. Generally there was an initial chill. Occipital or frontal headache was rapidly followed by delirium, with subsultus tendinum, some deafness and defective vision. Epistaxis was an early symptom and seemed to be a measure in some degree of the severity of the attack, it being more frequent in the severe cases. The tongue for the first three

* *Chicago Medical Examiner*, Vol. VII, 1866, p. 666.

† See page 502, *supra*.

‡ *Northwestern Medical and Surgical Jour.*, 1870–71, Vol. I, p. 367.

§ *Detroit Review of Medicine and Pharmacy*, Vol. IX, 1874, p. 387.

weeks was moist, deep scarlet in color, with elevated papillæ about the tip and sides and slightly furred at the base. The stomach was sometimes irritable. The abdomen was tympanitic: the bowels irregular, diarrhœa and constipation alternating, and susceptible to the action of purgatives: the discharges fetid, at first dark-brown or black in color and afterwards of a light yellow. Mucous râles were generally heard in the lungs. The fever was distinctly and regularly remittent in character, and the skin at times bathed with perspiration without any diminution of the bodily temperature, and at other times dry and harsh without any marked increase of surface heat. Moreover, about the eighth or ninth day from the initial chill or pain a remission occurred of so marked a character that it appeared as if the fever had subsided: but in about thirty-six hours the fever recurred and pursued a uniform course, so that one day was an exact representation of another day, but for the increasing prostration and coma tending to death. If not fatal a slow convalescence similar to that from typhoid led to recovery. Petechial spots, appearing generally as early as the tenth day, were found in most of the cases, usually on the abdomen and arms: in some they were numerous, in others not more than five or six.

T. K. Powell,* Dyersburg, Tenn., under the title of typho-malarial fever, describes an epidemic that prevailed in Haywood County in the autumn of 1881. By some it was called typhoid, by others typho-malarial and by others again continued malarial fever. The prevailing diseases of the county are of a malarial character, but Dr. Powell does not remember to have seen a case of intermittent fever during the height of the epidemic in question. In connection with its causation he refers to the extremely hot and dry weather of the preceding summer. In a certain proportion of the cases hemorrhage from the bowels was present, not in the beginning or congestive stage as in intermittent or remittent fever, but at the height of the disease. Some cases were characterized by a pointed tongue with red tip and edges, rose-colored spots, tympanites, tenderness in the right iliac region, diarrhœa and low delirium. Few cases were fatal. No *post-mortem* examinations were made. Dr. Powell regarded it as a mild form of typhoid, influenced to a great extent by the malarial poison, as shown by marked morning remissions or even intermissions in the early days of the fever.

Jeff. D. Williams,† Philadelphia, Miss., has published a case to illustrate his general description of the disease and his statement that it seems to be only a milder form of typhoid.

Dr. Davy‡ submitted to the Cincinnati Medical Society two illustrations of fever without rose-spots, which, for want of a better name, he was in the habit of calling typho-malarial fever. "A boy, aged ten years, had staid at home from school on Thursday, but was first seen by the doctor on Saturday. His temperature was 103°, his pulse about 110 per minute, bowels slightly constipated and tongue white. He had considerable thirst and loss of appetite, but he refused to go to bed. The case had appeared altogether similar to a slight attack of malarial fever, and the speaker thought a mercurial purge and liberal doses of quinia would bring about convalescence in a day or two. The day following, however, the patient was not improved, still having a temperature of 102.5°. The next day he went to bed complaining of a severe pain in the frontal region, while his tongue became heavily loaded and his pulse beat 120 per minute. He went on growing worse for a few days. The day was passed in mild, the night in wild delirium, with jactitations, subsultus tendinum and picking at the bedclothes very well marked. About this time slight diarrhœa set in, accompanied by some abdominal pain. There was no gurgling of the right iliac region and no rose-colored spots or sudamina at any time to be seen. The delirium subsided in about a week and he made a gradual but complete recovery. The other case was that of a girl of fourteen on the verge of the first catamenial period. She had been indisposed for several days but refused to go to bed. Her temperature was not above 103°, her pulse about 100 per minute. On the second day following she went to bed complaining of a slight headache only. From this time her condition became gradually aggravated, mental aberrancy and slight delirium also appearing. About the beginning of the attack she had had a spell of nose-bleeding, but it did not recur. About the fifteenth day, when she was apparently convalescing, she discharged from the bowels about a pint and a half of dark blood in three stools. For about a week previous to these bloody discharges she had pain in the abdomen and diarrhœa, but this was readily controlled by an opiate. The appetite was almost though not entirely lost. The tongue once became clean and then recoated. Temperature remained about 102.5° most of the time, falling to 100° when convalescence was established: for a few days towards the end of the attack it was intermittent, showing a difference at one time of 2.5°."

W. Hilliard§ gives a chart of the temperature curve of typho-malarial fever, reproduced on the next page. He does not express his views on the etiology or pathology of the disease. "Its symptoms," he says, "are quite familiar to those physicians who have resided in the malarious regions of the south and southwest. Above all the rest of the essential fevers incident to this climate typho-malarial heat stands pre-eminent as to duration. While in a few mild cases the mercury will recede to 98.5° Fahr. after ranging above that point for fifteen days, yet in a large majority of cases the preternatural heat will extend over a period of at least thirty days: in some instances the pathological heat will last forty, fifty, even sixty days. Lastly in the cases of this type the thermal waves are generally high: for the first two or three days the lowest markings will be 100° Fahr., the highest 104°, 105° or even 106.5° Fahr. The thermal wave during this period in small apparatuses the same as that of remittent fever. Gradually, however, these high altitudes subside into a gentle undulating thermal wave only a few degrees in mild cases above the health-line. Finally, when the mercury sinks to the health-line, it will suddenly rise a few degrees above, then fall to rise again, displaying the thermometry of intermittent fever."

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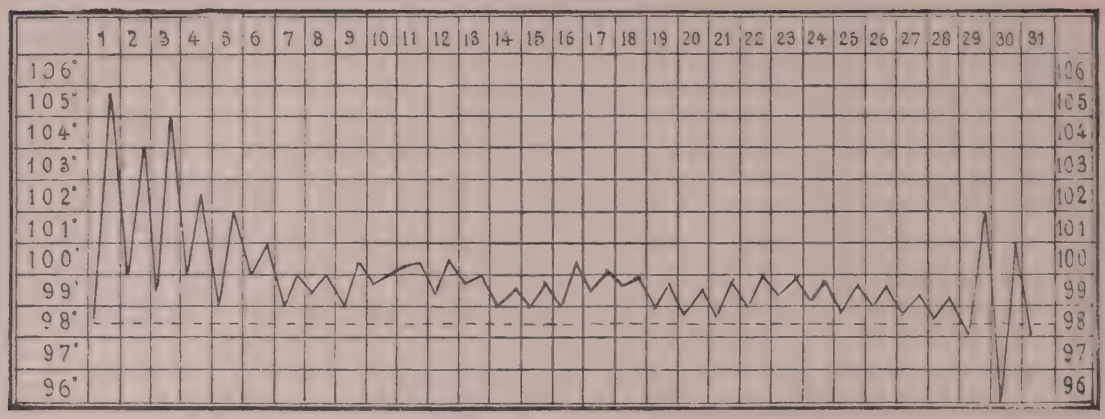
* *Trans. Med. Soc. Tennessee*, 1882, p. 64.

† *Reports in Cincinnati Lancet and Clinic*, 1882, p. 356.

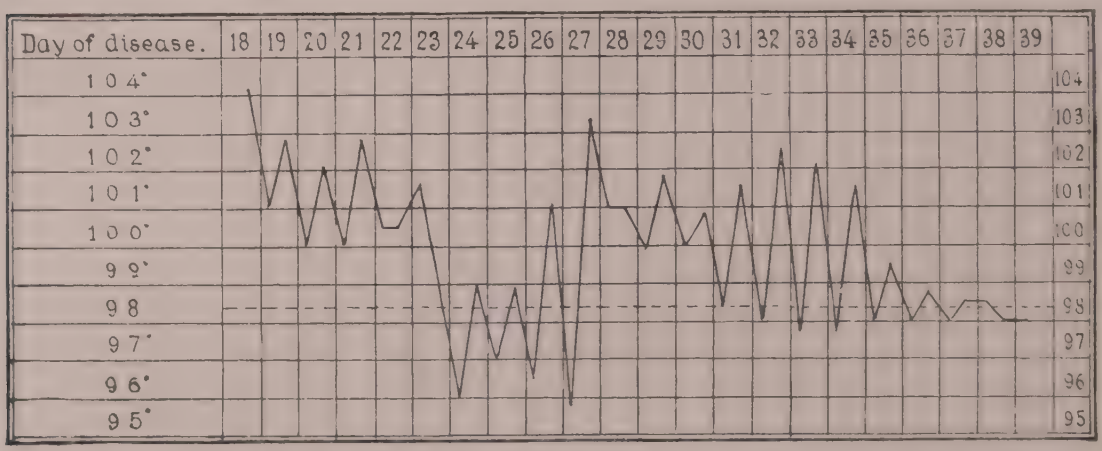
‡ *Virginia Medical Monthly*, Vol. III, 1876–77, p. 859.

§ *On the Medical Topography of Certain Diseases as they prevail in the South and Southwest.—New Orleans Medical and Surgical Journal*, 1877–78, p. 32.



Two temperature charts of typho-malarial fever, drawn by Surgeon F. L. Town, U. S. Army, Fort Sill, Indian Territory, are on file in this office. The cases occurred in 1877. Many remittents were treated at the post during the summer and fall of that year, but only in these two cases were typhoid or adynamic symptoms developed.

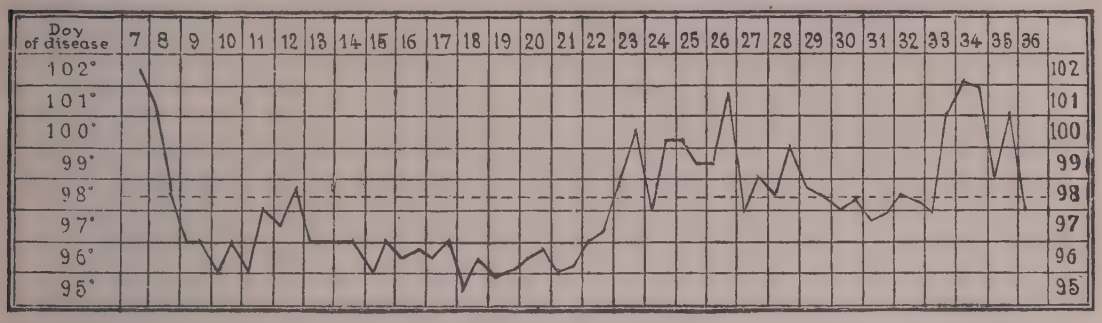
Case 1.—Private Geo. W. Barnes, Co. A, 4th U. S. Cav., was admitted to hospital September 13, presenting symptoms similar to those of a tertian intermittent but with unusual depression. The exacerbations did not yield to antiperiodics, and after a few days the case assumed the character of a remittent with diarrhœa, the abdominal symptoms becoming gradually more prominent. Prostration was progressive and the fever slowly assumed the continued form, which was fully developed on the 18th day after admission. Up to this time no record of temperature



was made, as the case had not differed materially from other severe remittents. There now appeared low delirium with increasing stupor, prostration and involuntary discharges, which were associated on the 23d day with a rapid and abnormal lowering of the temperature. The gravity of the symptoms appeared to indicate a speedy and unfavorable termination. On four consecutive mornings the temperature registered was one or two degrees below the normal. On the 27th day it rose from 95.6° to 103.4°, after which it did not again fall below the normal. Soon after this the patient began to mend, although convalescence was not established until the 37th day. Some degree of mental aberration persisted until the patient began to sit up, and even until he was able to walk into the dining-room at meal times. He was returned to duty December 10.

Case 2.—Private Charles Krull, Co. B, 16th U. S. Inf., was admitted to hospital October 12. This case was of equal severity, although the abdominal symptoms were not prominent and there was no diarrhœa until the close of the attack. The progress of the fever was characterized by a prolonged period of abnormally low temperature. On admission the case presented the appearance of a severe remittent with rapidly increasing prostration. By the 7th day the typhoid condition was unmistakably manifested, and a record of daily temperature was commenced. Cerebral symptoms appeared and the bodily heat fell to below the normal and continued below this point from the 9th to the 22d day of the disease. During the continuance of this vital depression the skin was cool to the touch, and the patient lay in a condition of partial stupor, moaning at intervals as he breathed and having involuntary passages; the pulse was slow and weak—50 per minute on the 11th day; by gentle shaking and questioning he could usually be

partially aroused, but his attempts at articulation were incoherent, if, indeed, they did not fail altogether on account of the parched condition of the mouth, tongue and fauces. After the temperature rose, on the 23d day, an amelioration of the symptoms was perceptible. From this time until about the 28th or 29th day the patient would at intervals cry out as if alarmed, and continue this as loud and as long as his exhausted condition would permit. Subsequently



the case progressed slowly to convalescence, with occasional recurrences of moderately increased temperature and accelerated pulse, due probably to intestinal lesions, as some diarrhœa occurred during this stage. He was not finally returned to duty until March 4, 1878, and even then he was somewhat anæmic. By April 20, however, he had in a great measure recovered his usual weight and strength. The temperature observations were made in the axilla.

These two cases show the coincidence of the typhoid condition and an abnormally low temperature. Two other cases, filed in this office since the war, associate these low temperatures with the weakness of convalescence; they were reported from Fort Duncan, Texas by Ass't Surgeon E. T. Comegys, U. S. Army.

Case 1.—Private Claudius Mausoz, Co. K, 8th Cav., a young French recruit; robust and healthy; was admitted June 7, 1876, complaining of diarrhœa. The case remained under observation until the evening of the 7th day, when treatment by baths, quinine and stimulants was adopted. The record has few entries except as regards treatment. On the 13th day the patient was restless and had a steady and dull pain over the liver. On the 28th day profuse nocturnal perspirations were noted. He was able to sit up in bed on the 30th day, and two days later he began to sit up in a chair. He is said to have recovered his strength slowly and to have been returned to duty August 28. In comparing the course of treatment with the chart it is found that a distinct impression was made in the curve of temperature by the administration of large doses of quinine. On the evenings of the 7th, 8th and 9th days ten grains were given; this dose was doubled on the 10th and 11th days; thirty grains were given on the 12th, 13th and 14th days, after which small doses were occasionally used until the 18th, 19th and 20th days, when large doses were again administered. Two days after the temperature fell below the normal the patient was able to sit up in bed. When the temperature again reached the normal line, at the end of the thermometric record, he was on full diet and able to walk about. The temperature charts of this case and of that which follows are submitted on the next page.

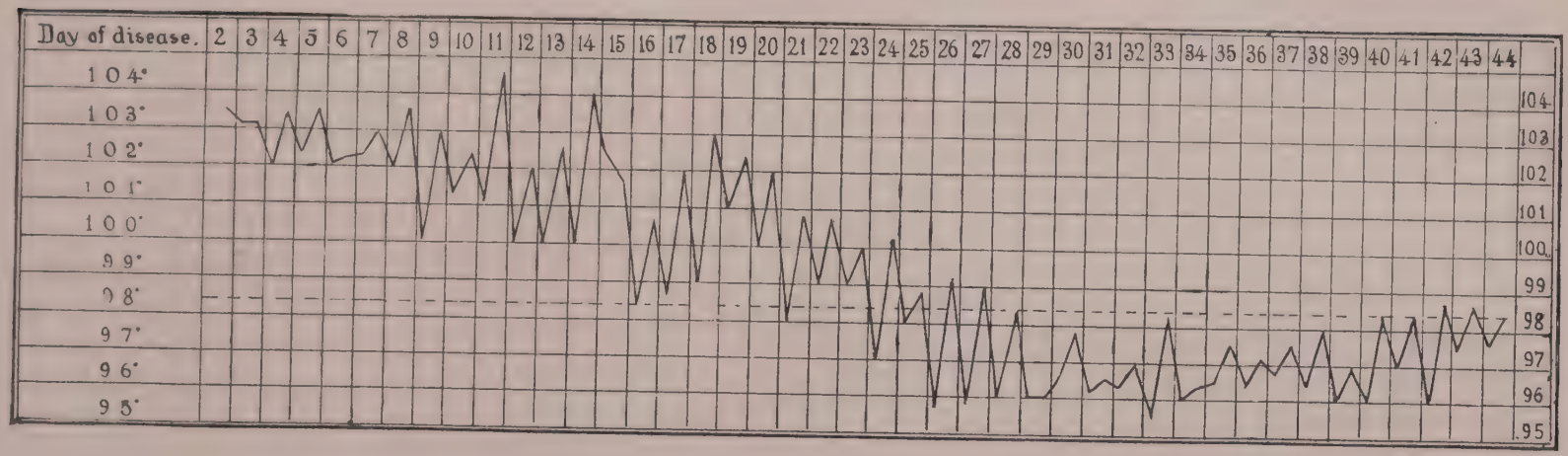
Case 2.—Private Edward R. Stafford, Co. K, 8th Cav., a young, healthy but rather delicate-looking recruit, reported June 8, 1876, as affected with headache, weakness and dizziness. The case remained under observation until the evening of the 6th day, when quinine, the sponge-bath and stimulants were ordered. Epistaxis is the only symptom mentioned; it occurred on the 9th, 10th and 27th days. On the last-mentioned day the temperature fell below the normal; two days later the patient was able to sit up in bed; four days after this he was walking about the ward, and in three more days he was permitted to go out. During this period of improvement the temperature was generally considerably below the normal.

Post-mortem records have been rarely published. In the few cases in which the anatomical conditions are mentioned typhoid fever appears to have been absent. Carstens of Detroit, speaks of enlargement, pigmentation and ulceration of the solitary follicles, Peyer's patches being unaltered or merely congested; but there is nothing in his article to show that his statements were founded on original researches.* C. B. White, U. S. Army, announced as his personal experience and that of Dr. Loving of Columbus, Ohio, the existence of ulcerated patches in the colon rather than in the small intestine.† Worthington of Los Angeles, Cal., reported three cases in which, with congestion, pigmentation and ulceration of the intestinal mucous membrane there was no affection of the glands of Peyer.‡

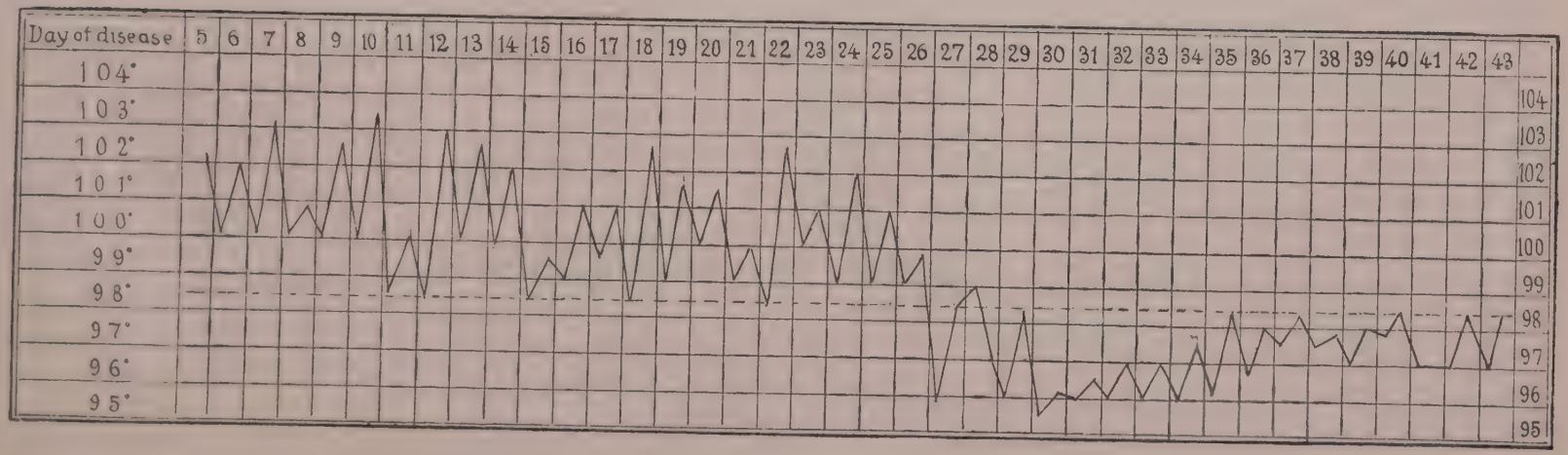
The term typho-malarial has also been given of late years to the fevers of the Rocky

* *Supra*, p. 512. † *Supra*, p. 515. ‡ *Supra*, p. 512.

Thermometric Record in the Case of Private Claudius Mausoz, Co. K, 8th Cav.



Thermometric Record in the Case of Private Ed. R. Stafford, Co. K, 8th Cav.



Mountain region.—the mountain fever of the frontiersmen.* At first these fevers were supposed to be something new, dependent on the rarefaction of the air or some obscure atmospheric causes;† by some, however, they were regarded as malarial.‡ BARTHOLOW, while serving with the expedition to Utah, saw two forms of fever: Malarial fevers first affected the troops, and two months later typhoid became associated with remittent fever not only in the camp but in the individual; rose-colored spots were present in some of the cases, and all those that were fatal showed the intestinal ulcerations of enteric fever. Probably the aggregation of troops constituting the army of Utah had an influence in determining the occurrence of typhoid in BARTHOLOW's experience. Certainly this disease became less frequent in the service of officers who were on duty in that part of the country at later dates and with smaller commands. Moreover, when typhoid fever was recognized it was so reported and its cases ceased to form a constituent part of the totality of the records of mountain fever. The former was rare, the latter common. At Fort Bridger, Wyoming Territory, for instance, in a mean strength of 153 men there were recorded during the eight years, 1866–73, fifty-nine cases of mountain fever expressed as malarial remittent and but one case of typhoid fever. Among medical men the name mountain fever came, therefore, to be synonymous with remittent or continued malarial fever.

A species of remittent fever, called by the citizens *mountain fever*, is the prevailing disease. It is easily controlled by quinine.§

F. RICE WAGGONER‖ gives the record of three cases illustrative of this disease. From a consideration of the surroundings of Fort Lyon, at which his cases occurred, and from the prevalence of severe intermittents and remittents in the same garrison at the same time, he believed this continued fever to be of malarial origin, and the efficacy of large doses, sixty to seventy-five grains of quinine daily, gave therapeutic support to this view. The absence of enteric symptoms appeared to indicate that the fever was not due to the typhoid poison.

Ass't Surgeon J. H. PATZKI, U. S. Army, reports from Fort Steele, Wyoming Territory,¶ that: A remittent fever, occasionally very severe, is met with, by the mountaineers called mountain fever and much dreaded by them. The most prominent symptoms are headache, severe aching through the whole body, insomnia, furred tongue, frequent, full pulse, constipation. Chills are frequent. The efficacy of large doses of quinine proves the malarial origin. The mountaineers treat it with their panacea, sage tea, and, as they assert, quite successfully. Men cutting timber along the streams, mostly Danes and Swedes, suffer most from this fever.

Surgeon CHARLES R. GREENLEAF, U. S. Army, in a letter from Fort Benton, Montana, says: The subject of mountain fever is one in which I have taken a great interest, having met the disease during my tour of duty on the *west* side of the Rocky Mountains in Idaho, in 1869–73, and again during my present tour on the *east* side of the same range. I was much struck with the similarity of its features in both localities, but more particularly with its close resemblance to the malarial fevers I had treated in the South during the intervening four years 1873–77. Recently I have treated, among the citizens in and about Helena, a great many cases recognized by the local physicians as mountain fever, which I regarded as pure malarial fever, and successfully treated accordingly; I kept careful notes of all my cases in civil and military practice and am thoroughly satisfied that the disease is malarial remittent. The name of mountain fever is simply a local one, the use of which should be discouraged in the profession as causing confusion and misleading new comers to the country. The disease runs a course precisely similar to those of our Southern and Western remittents, assuming a typhoid type in severe and long-continued cases and yielding readily to vigorous doses of quinine. I think your term typho-malarial is admirably descriptive of its later stages so far as symptoms go; as to the pathological significance of the term I cannot say, never having made a *post-mortem* examination nor in fact had a fatal case.**

But in the meantime the term typho-malarial, imported into these regions and applied without reference to pathological restrictions, became to many practitioners a generic title

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* [illegible] Mountain fever [illegible] by ALFRED WISE.—*British Medical Journal*, Vol. II, 1880, p. 805—is not the mountain fever of [illegible] due to sudden exposure to diminished atmospheric pressure and corresponding rarefaction of the air. The mental [illegible] Vol. II, p. 161. False; but its chief feature was cardiac irritability, the [illegible] to the exercise taken.

† [illegible] *Medical and Surgical Journal*, Vol. XIII, 1856, pp. 105–115.

‡ [illegible] *Northwest Medical and Surgical Journal*, Vol. VIII, 1851, pp. 105–108, and *Boston Medical and Surgical Journal*, Vol. XLIV, pp. 511–512.

§ Letter of JOHN H. FINROCK, Ass't Surg. 11th Ohio Cav., Fort Halleck, Idaho.—*Boston Med. and Surg. Jour.*, Vol. 69, 1863–64, p. 527.

‖ *American Jour. Med. Sciences*, Vol. L, 1865, p. 50.

¶ *Report on the Hygiene of the U. S. Army*, 1875, p. 385.

** Dated July 7, 1878, to Surgeon J. J. WOODWARD, U. S. Army.

equivalent to mountain fever, in which the lines of separation into typhoid, typhoid with malarial complications and malarial fevers with typhoid *symptoms* were more or less obliterated. For instance:

Surgeon F. L. Town, U. S. Army,* states that remittent and typho-malarial, and probably enteric fevers, are not infrequent in the spring and fall, especially among miners and hunters, or persons who are generally without shelter; these, in the parlance of the country, are called mountain fevers indiscriminately.

Ass't Surgeon Geo. P. Jaquette, U. S. Army, reported from Fort Bowie, Idaho, the occurrence of an occasional case of fever, either remittent or intermittent, commonly called in this country mountain or typho-malarial fever.

One of the most recent papers on mountain fever,† or as the writer calls it, typho-malarial fever, gives a history of five cases aggregated under this generic title. One case proved fatal, and on *post-mortem* examination the lesions of typhoid fever were discovered. This case is of particular interest as showing the development of that fever in one of five hundred men, all of whom had been on scouting duty in an unsettled country for four months before the disease made its appearance in his person,—in fact, the spontaneous or miasmatic origin of typhoid does not require a stronger illustration to establish its existence. But it is not on this account that Dr. Hoff, the writer of the article in question, describes the case: He makes use of its typhoid lesions to infer the existence of similar lesions in all the cases that have been described and treated as mountain fever.

The five cases were turned over to Dr. Hoff at Fort Fetterman, Wyo. Ty., by Acting Ass't Surgeon A. J. Gray, U. S. Army, chief medical officer of the expeditionary column. This command, consisting of about five hundred men, took the field May 24, 1878. It was well equipped, having ample and suitable clothing, tentage and rations; and, moreover, its morale was excellent. Its first permanent camp was on the Clear Fork of Powder River, three miles from the eastern base of the Big Horn Mountains. The only feature of this camp to which exception might be taken was the water-supply, which, although at first soft, clear and pleasant to the taste, had, later in the season, a suspicion of vegetable infusion. From this camp the command moved July 15 to a similarly good site on Rock Creek, a few miles to the northward. The duties of the men were light; the temperature equable and never oppressive. The only sickness recorded consisted of a few cases of intermittent fever, in all of which there was a history of previous malarial toxæmia. On September 5 the troops broke camp to cross the mountains to Camp Brown (now Fort Washaki) which was reached on the 14th. During this march they encountered a rain- and snow-storm which covered the country to a depth of twelve or more inches and flooded the streams with turbid water. The water-supply during this time was obtained from the melting snow. The health of the men continued good until the 12th, when a strong young soldier of good habits, who afterwards became one of Dr. Hoff's five cases, was seized with intermittent fever, which yielded to large doses of quinine. He resumed duty on the 16th. On the 19th the command left Camp Brown, but meanwhile three men had been taken sick with symptoms of paroxysmal fever and were left under treatment at that post. On arriving at Fort Fetterman on the 28th five patients were turned over to Dr. Hoff, two as cases of quotidian, two as tertian and one as remittent fever. "That these cases," Dr. Gray says, "were malarial there is in my opinion no room for doubt, but whence came the toxic germs? Reasoning by exclusion I am compelled to attribute their source to the water formed by the melting snow." But although presenting these characteristics at their inception and during the early period of the attack, when transferred for treatment at Fort Fetterman the febrile action was of a continued or subcontinued type.

In case I the morning temperature was about the normal, but a diurnal elevation averaging two degrees of Fahrenheit's scale was manifest for ten days after the patient's arrival at Fetterman. From the history and temperature chart, constructed after his admission into hospital, this man was apparently recovering from an attack of malarial fever which had been in part controlled by quinine.

In case II the temperature oscillated from 102° to 105° Fahr. for six days after admission into hospital, when fifteen grains of quinine, administered on the morning of October 4 and repeated on the evening of that day, sent the temperature down to 97.4° on the following morning. Similar doses thereafter prevented the recurrence of the former high temperatures. Quinine was continued until the 22d, at which date convalescence was progressing rapidly. The temperature charts of these two cases are given on the opposite page.

In case III the subcontinued fever persisted for a long time. A careful study of this case shows that thirty grains of quinine daily, usually given in morning and evening doses of fifteen grains each, exercised a beneficial influence. Occasionally, when a day was permitted to pass without the exhibition of the specific, the temperature immediately ran up to 104° Fahr. During a considerable portion of the time the daily dose amounted only to ten grains; but when, on November 14, more than six weeks after admission, large doses were administered, the disease was immediately controlled and convalescence established. The accompanying chart, constructed from Dr. Hoff's

* *Report on the Hygiene of the U. S. Army*, 1875, p. 434.

† *Typho-malarial Fever, the so-called Mountain Fever of the Rocky Mountain Region.*—By J. Van R. Hoff, *Ass't Surg. U. S. A., American Jour. Med. Sciences, N. S.*, Vol. LXXIX, 1880, p. 38 *et seq.*

Chart of Dr. Hoff's First Case.

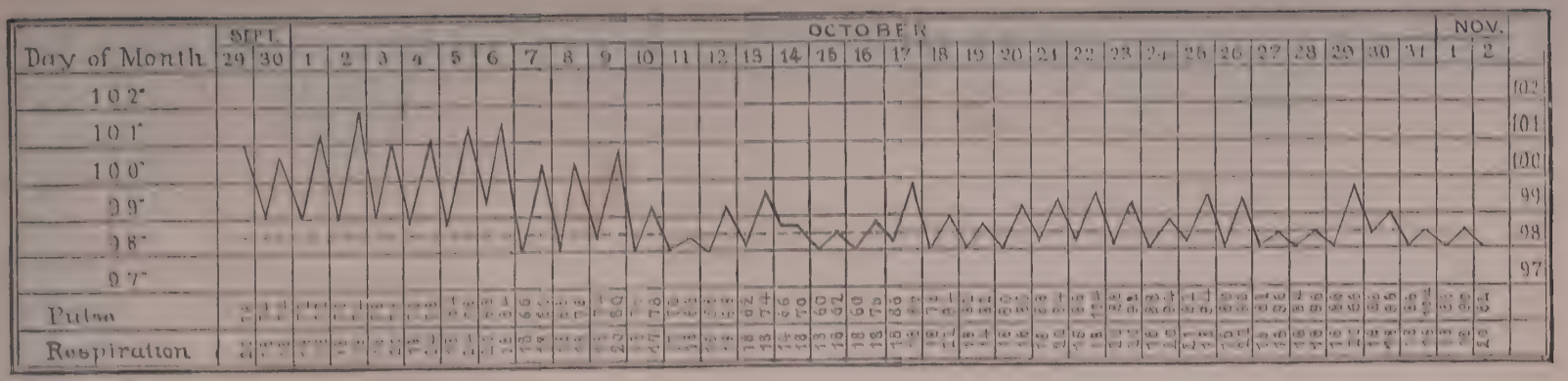
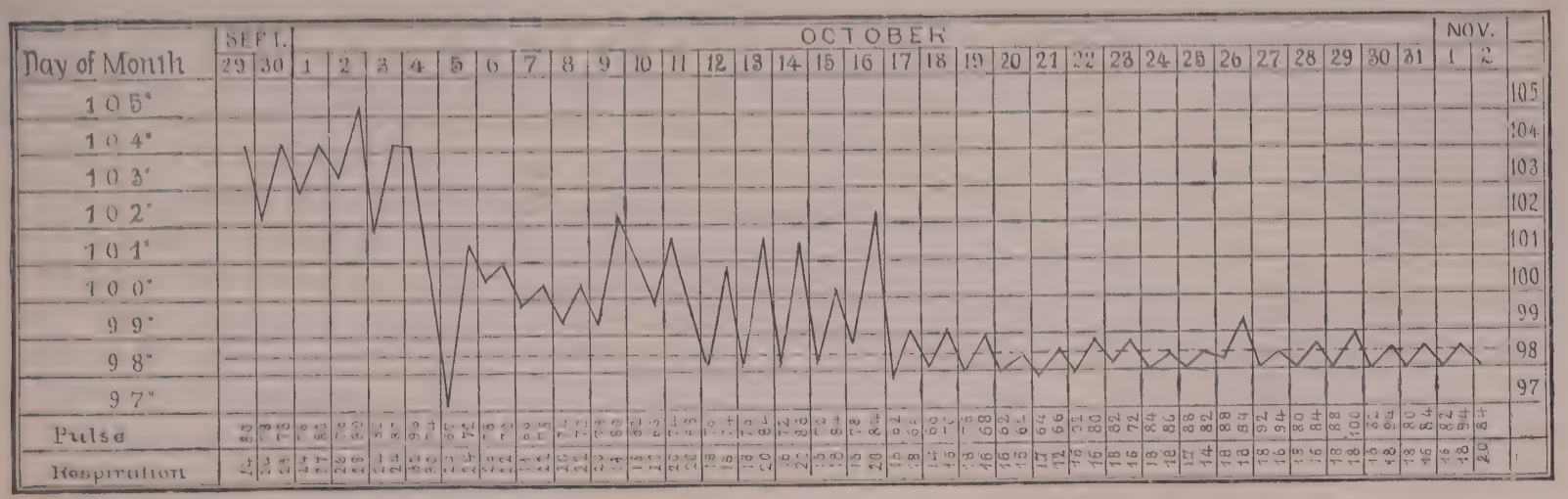
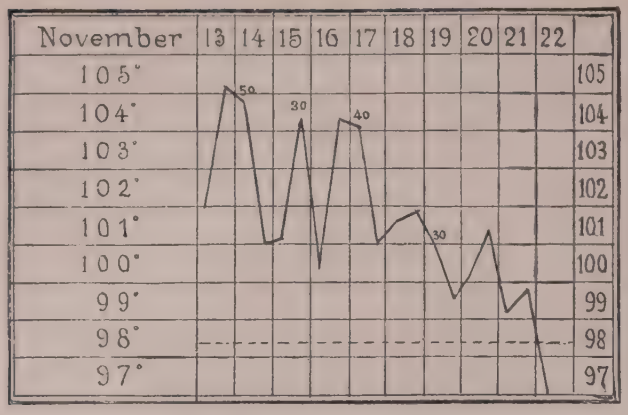


Chart of Dr. Hoff's Second Case.





Temperature Chart of Dr. Hoff's 3d Case.

record, illustrates the effect of four doses given between the 14th and 19th. After this the case was completed with hardly a symptom worthy of remark. The periods of administration and the quantity, in grains, of the quinine which produced the defervescence are indicated on the face of the chart.

In case IV, also, the febrile action was markedly under the control of the quinine administered.

Case V was the only one in which there was a distinct approximation to the *status typhosus*. The patient was much emaciated, and delirious on admission on the 20th day of the attack, the tongue slightly coated in the centre, clean and pink at the tip and edges. During lucid intervals he complained much of headache; his abdomen was tender but the bowels were not relaxed. While improving somewhat in his general condition he was seized with symptoms of peritonitis and died November 11, the 32d day of the disease, from perforation in the site of an ulcerated patch of the intestinal glands.

In all these cases excepting the first, the convalescent case, there were chills, fever and perspirations recurring with greater or less regularity, and these were of such a character that they could not be regarded as recrudescences or relapses of typhoid. In no case was the ultimate defervescence effected by the oscillations of decline considered characteristic of typhoid fever. There was much headache in all, with some delirium in two of the cases; diarrhœa in none,—on the contrary, the patients were all more or less constipated; nor did meteorism exist in any of the cases, although there was some abdominal tenderness; the tongue was thick, flabby, coated at the base but clean at the tip and edges; the breath was offensive. In one case the patient said he had noticed some red pimples on his chest and abdomen about the sixth day of his sickness, and in this case Dr. Hoff observed, about the thirty-sixth day, on the chest and abdomen a papular eruption which remained for many days, the papules meanwhile increasing in number; they were of a bright-red color, painless and disappeared on pressure. In two of the cases there was acute nasal catarrh and in three herpes labialis; convalescence was rapid; the hair did not fall; moreover, quinine seemed to exert a specific rather than an antipyretic influence. Here are none of the characteristic signs of typhoid fever; on the contrary several are inconsistent with the generally accepted clinical history of that fever. All, however, agree with the records of a subcontinued malarial fever modified by inefficient specific medication.

The malarial element in all may be granted; but Dr. Hoff claims that since a specific typhoid was present in the fatal case, it must have been present likewise not only in the other cases that occurred in this command but in all other cases of so-called mountain fever. He considers it reasonable to assume that the external causes of disease are identical when the outward conditions of the patients are similar. Believing that this will be conceded he argues that the diseases known under the name of mountain fever have no essential differences, and since, in his fifth case, the disease was truly typho malarial, all mountain fever cases must, therefore, be typho-malarial. But, as we know by our war experience, the outward conditions of the patients in cases of adynamic remittent and continued fevers were frequently so *similar* to those of typhoid fever as to be indistinguishable from them. To concede that these cases were due to the *same* external causes is impossible without allowing the identity of the malarial and typhoid poisons; and, in view of our present knowledge of these poisons, this would be absurd. The same argument, rallying on the *post mortem* appear-

ances reported by CARSTENS, WHITE and WORTHINGTON, as pertaining to the typho-malarial fever of civil life, would lead to the equally false conclusion that there is no typhoid element in this fever. In both instances the erroneous conclusion is the result of the inadmissible assumption introduced into the argument.

The clinical experience of our medical officers in the Western Territories from the time of the overland invasion of the gold fields of California cannot be offset by a case of death from typhoid perforation of the intestine. Twenty years before Dr. HOFF recorded this case BARTHOLOW reported similar cases with the *post mortem* appearances in every instance indicating the presence of specific typhoid fever.—indeed, there are few Western posts from which typhoid fever has not been reported: but this does not appear to have led our medical officers or the civilian practitioners in that part of the country to believe that all the febrile cases coming under their observation are cases of specific typhoid,—on the contrary they recognize the prevailing fever to be a malarial remittent on account of its amenability to quinine and its persistence in the absence of antiperiodics. The rarity of fatal cases at present, when medical attendance and quinine can be had in almost all parts of the country, as compared with the fatality of the disease in the early days of settlement and overland emigration, when the means of treatment were unattainable or misunderstood, points to the absence of the typhoid element in the majority of the cases: in fact, the present death-rate is alone sufficient to show the absence, as a general rule, of a specific typhoid fever.

Nevertheless, it is probable that in most of the fatal cases of fever in the Rocky Mountain region typhoid ulcerations will be discovered notwithstanding the greater prevalence of malarial remittents in the locality. It has been already pointed out that although malarial remittents during the war predominated over typhoid in the proportion of 3.7 to 1, the chances in favor of discovering typhoid lesions in a fatal case of low fever were as high as 7 to 1, and that in the third year of the war, when the great typhoid epidemics had subsided and the remittents outnumbered the typhoid cases more than sixfold, the chances were still 5.4 to 1 in favor of the discovery of specific lesions after death from a low form of fever.* The fatal cases do not therefore indicate the nature of the prevailing disease in the febrile cases under discussion.

Where facilities for *post-mortem* observation are to be found there are usually also facilities for treatment that give the malarial case a more desirable termination. It is among the hunters, herders and prospectors who fall victims at a distance from medical aid that *post-mortem* illustrations of the formerly fatal malarial remittents are to be expected, but in such cases the investigation can seldom be made. Moreover, it must be remembered that the negative character of the *post-mortem* testimony—in cases where typhoid fever is not present—deprives it of one of the methods of record, that by preservation of the specimen.†

The sanitary environment of the miners, lumbermen, prospectors, surveyors, herders, settlers and soldiers on scouting duty, who are the chief sufferers from this mountain fever of the West, has been and even now is similar to that of our troops during the war. They are subject to great fatigue, exposures by night, climatic and weather changes, with imperfect, badly constructed and oftentimes overcrowded shelters, deficient clothing and bedding, monotonous and sometimes scanty diet and impure water supplies. Naturally we should expect to find the same diseases developed in both classes of men, and it is contended here

* *Supra*, page 375.

† Probably few medical men would mount and preserve a piece of apparently sound ileum by way of illustrating its condition in a case of so-called typho-malarial fever as was done by Dr. G. B. BATES, of Yonkers, N. Y.

that this expectation is realized: that there is aggregated under the term mountain fever the malarial and typhoid fevers and the association of both that constituted the camp fevers of the war. The application of the term typho-malarial to them is in principle as much to be deprecated as its original introduction in 1862, when, as has been seen, it gave official license to confound together febrile conditions which, to be studied with satisfaction, should have been left apart.

Important practical results hinge upon the application or disuse of this term. To authorize its application is to acknowledge the inability of quinine to remove the disease, and cases which might have been cured in a few days will terminate fatally, as in the first of those reported by Surgeon GEO. A. OTIS, U. S. Army;* or the unnecessary prolongation of the attack will exert a dangerous strain on the constitution of the individual, as is plainly illustrated by the third of Dr. HOFF's own cases.

From this brief survey of the use of the term typho-malarial since the war, it is seen that although a more accurate knowledge of the restrictions on its application has been acquired by the profession than was possible during the war, it is still capable of involving in uncertainties the cases to which it is applied unless associated in every instance with an explanation of the views that dictated its use. If the term be retained in our medical nomenclature it should be restricted to typhoid fever modified by acute malarial manifestations. Preferably it should be abandoned. Its use during the past twenty years has tended to the detriment of individual cases and the retardation of medical progress. At the present day we are ready to fall back to the position occupied before the war, arranging these continued fevers for clinical as well as scholastic purposes into the three classes:

Ephemeral and continued fevers, the causes of which are obscure, some being apparently due to overfatigue and exposure, others to emanations into air and percolations into water from cesspools, sewers and other hotbeds of fermentative action;

Typhoid fever, a specific fever of miasmatic origin, propagated, especially in older settlements, by various modes of indirect infection,

And *malarial* fevers, due to a specific and extensively diffused miasm practically free from infectious qualities.

Eventually medical men will, no doubt, become able to discriminate between an obscure case of typhoid, a cesspool fever, complicated or not with malarial manifestations, and a continued or remittent malarial fever which has assumed a typhoid type; but this assuredly will not be hastened by confounding all such cases in the meantime under the title of typho malarial.

V.—TYPHUS FEVER.

Although most of the cases reported under this heading by medical officers serving with troops in the field were probably typhoid fevers aggravated by malarial complications and an insanitary environment, it is impossible to dispose in this manner of the epidemic that affected the Salisbury prisoners at Wilmington, N. C. This disease must have been typhoid, malarial, typhus or some unknown malignant fever of unusual character and peculiar origin. The last supposition cannot be entertained in the absence of positive and affirmative testimony to some at least of its unusual characteristics. The rapid spread of the disease to the garrison and citizens of Wilmington is inconsistent with our experience of typhoid except as suddenly propagated by the contamination of a general water-supply; but we are led to understand that the main factor in the extension of this epidemic was a direct contagion from the sick to the well. Medical officers in attendance were taken sick and died; most

* See *supra*, page 373.

of the men employed on the steamers used in the transportation of the prisoners to Wilmington suffered from the fever; even isolated settlements in the surrounding country were invaded by the disease through the medium of negroes seeking safety by flight from the contagion of the camps and city. Moreover, the infection of so large a proportion of the prisoners, 3,400 out of 8,600, with typhoid is inconceivable, for most of these men must have been insusceptible to the disease by virtue of the exposures incidental to their service before capture together with the even greater exposures to the typhoid miasm that attended their period of confinement. Remittent fevers were common in that department, and MOREHEAD refers to an adynamic remittent fever of suspected infectious character;* but had the fever that affected and spread from the prisoners been of a malarial nature the milder of the epidemic cases, by their amenability to quinine, would have thrown light upon the more serious cases. Medical officers who had served for four years in malarious localities would assuredly have demonstrated the character of this fever if it had been a malarial remittent. It must, therefore, have been a true typhus, as diagnosticated by Dr. HAND and the medical officers serving with him during the epidemic. Moreover, this view appears to have the support of the few *post-mortem* investigations that were made.

It may be well, before proceeding further, to submit what is known with regard to the history of these men prior to their appearance at Wilmington. The records of this office are silent on the subject; but fortunately the Report of the Committee of the 40th Congress on the treatment of Prisoners of War by the Rebel Authorities gives much information concerning their condition, containing among other papers a report of an inspection made by Captain T. G. Hall, under orders from the Confederate War Department and at the instance of Governor Vance, of North Carolina, on February 17, 1865, a few days before the prisoners were exchanged.

The prison at Salisbury, N. C., consisted of a brick factory four stories high, forty by one hundred feet, with five buildings formerly used as boarding houses for the operatives. A board fence surrounded the buildings, enclosing at first five acres of ground, a space afterwards enlarged to eleven acres. In October, 1864, ten thousand men were sent to this depot, crowding the enclosure to its utmost capacity. The buildings were soon filled with the sick and dying. Those who were unable to obtain admission remained without shelter other than one Sibley tent for each hundred men, and were exposed to the rigors of the following winter. After a little while they went to digging holes and tunnels in the ground with any tools they could procure, such as case-knives and broken canteens. In these holes they slept at night and staid most of the daytime. The soil was a stiff tenacious clay which, after a rain or snowfall, became converted into a perfect bog and remained wet for a long time. No efficient details were made for the purpose of policing the grounds: filth of every kind was allowed to be deposited and to remain anywhere and everywhere around the quarters, unsightly to the eye and generating offensive and no doubt dangerous odors. It was considered that in warm weather the sinks would not fail to prove a source of great annoyance and possibly of pestilence not only in the prison but in the town of Salisbury. The regular ration, according to one of the prisoners who testified before the committee, was bread, rice and soup, the bread being sometimes made of cornmeal, sometimes of cornmeal ground from the cobs as well as the grain: wheaten and mixed breads were also issued. The ration of bread was from four to eight ounces; of soup about half a pint. Occasionally a few spoonfuls of molasses and now and then some small potatoes were added to the ration. About two ounces of meat were issued once in six or ten days. Inspector General Hall's account of the ration, derived from a statement on paper of the amounts issued between February 1 and 15, is somewhat different in its tenor. "Compared," he says, "in quantity and kind with the rations issued to our own troops in the field, it will be seen that on this score the prisoners have no cause to complain. The rations are cooked before they are issued, and pains have been taken by General Johnson to see that no frauds are committed in this department to the injury of the prisoners. Bread and meat (or sorghum in lieu of meat) are

* *Researches on Disease in India*, by CHARLES MOREHEAD. London, 1860, p. 155. He is of opinion that malarial fevers are susceptible of assuming an adynamic type from the state of the constitution of the individual attacked and infectious properties from filth, crowding and bad ventilation in towns, camps and villages. CLARK and LIND held the same views. Although the greater attention paid to cleanliness and ventilation in recent times seems largely prevented any development of infection in connection with remittent fevers, occasional instances have been recorded. From 1875 to 1877 an adynamic febrile disease prevailed at Kattywar, Kutch and parts of Guzerat. A similar affection at Pali in Marwar in July, 1836, extended to the towns in the adjacent districts up to the middle of 1838. Dr. FORBES describes the disease as seen by him at Pali in 1848.—*Trans. Medical and Physical Society of Bombay. No.* 2, p. 14. His description bears much resemblance to that given by PRINGLE of jail or hospital fever. The fever was regarded as infectious, but in no great degree unless there had been continued exposure to the emanations. This infectious remittent was observed in 1849 in Gurhwal, in Kumaon and in 1853 in Rohilcund.

issued every morning, rice or pea-soup in the afternoon. The bread which I inspected in the bakery was of average quality and of the average weight of five pounds to the double loaf. A half loaf, therefore, the daily allowance of each prisoner, will average twenty ounces of bread, the equivalent of sixteen ounces of flour." The water-supply was limited and not more than sufficient for cooking and drinking purposes. It was derived from wells in the yard and from a creek about half a mile distant, to which the prisoners were permitted to go, a certain number at a time, under guard, with buckets and barrels. The want of a running stream within the prison enclosure for purposes of washing and general sewerage was greatly felt. The persons of the men were dirty, their clothing filthy and ragged. They suffered more than from any other cause from the want of sufficient and suitable clothing. They were generally destitute of blankets and had no other clothing than that which they had on at the time of their capture. Shortly before Hall's inspection three thousand blankets and one thousand pairs of trousers had been received from the United States for distribution among them; further supplies were expected. One of the most painful features connected with the prison was the absence of adequate provision or accommodation for the sick. With few exceptions all the buildings in the prison yard were used as hospitals. There was an entire absence of hospital comforts, bedding and necessary utensils. The reason assigned for this was that the articles if supplied would be inevitably stolen, since no guard was kept inside the prison enclosure. The number of sick in hospital on February 15 was 546. There were bunks for not more than one-half of this number; the rest lay on the floor or ground with nothing over them but a little straw which had not been changed in four weeks. For a period of nearly one month in December and January the hospitals were without straw, although the county (Rowan) was one of the largest wheat-growing counties of the State and thirty horses were standing idle in the prison quartermaster's stable. The supply of firewood was also needlessly limited. From Oct. 5, 1864, to the date of Captain Hall's inspection there died, according to the surgeon's report, 2,918 of 10,321 prisoners; but, according to the burial report, since Oct. 21, 1864, a less period by sixteen days, 3,479 bodies had been buried. This discrepancy was explained by the fact that, in addition to the deaths in hospital, six or eight men died daily in quarters without the knowledge of the surgeons and, of course, without medical treatment. Pneumonia and bowel affections were the prevailing diseases; but the prisoners appeared to die more from exposure and exhaustion than from actual disease.

The experience of many years and many epidemics has demonstrated the connection between poverty, famine and their attending conditions on the one hand and the prevalence of typhus fever on the other. In Ireland the worst developments of this fever have always occurred as a sequence to failures of the food-supply. Within the enclosure at Salisbury there was an accidental or artificially induced poverty, which, however, was attended with all the exposures and hardships that belong to the condition when resulting from natural famine causes. Whether the ration of bread was twenty ounces, as reported by the confederate inspector from the official ration returns of the prison, or six to eight ounces, according to the evidence of some of the consumers, it is certain that the men confined in this prison bore the impress of semi-starvation on their arrival in New York, although in the meantime every effort at recuperation had been made by the United States authorities and the U. S. Sanitary Commission. They had thus been exposed to one of the most powerful influences that predispose to typhus fever,—but not more so, indeed not so much so, as the unfortunates at Andersonville, among whom typhus did not make its appearance. Famine, therefore, while strongly predisposing to the development of the fever was not the essential element in its causation.

But some of the conditions associated with famine, as filth, personal, domestic and civic, from want of facilities and energy, overcrowding from deficiency of shelter, and in cold weather the inhibition of ventilation consequent on insufficient clothing and fuel, have been shown to be more intimately connected with the development of the disease than the famine itself, inasmuch as in its absence they alone have appeared sufficient in some instances to determine an outbreak of the disease. Indeed, many writers of the past considered the fever to originate in a human miasm generated under the conditions mentioned. Thus, they explained its appearance in crowded jails before the assizes which were to dispose of their inmates; in slave, emigrant and troop ships; in barracks and in the overcrowded and filthy slums of large cities before air space, ventilation and cleanliness were recognized as efficient against what was popularly regarded as a visitation of Providence. Many medical men, however, at the present day, although regarding these conditions as favorable to the devel-

opment and spread of the disease, consider them incompetent to generate it in the absence of the contagion from a previous case. One of our latest writers * states that there are certain endemic centres, such as Ireland, Italy and Russia, and that whenever the disease occurs in other localities it is due to importation: but this conclusion is derived from the investigation of one epidemic in New York City, which was traced back to Ireland from Bellevue hospital by way of a Mulberry street tenement house and a transatlantic immigrant.

On the other hand, medical literature is full of illustrations of the outbreak of the disease, under the conditions mentioned, where the previous case can only be admitted upon the most absurd assumptions. The germ theory has, during recent years, done much to clear away obscurities surrounding the causes of certain diseases, and the results have been invaluable to preventive medicine; but there is a danger that the enthusiastic adoption of this theory in all cases of specific disease may lead to error. The facts in the case of typhus-fever are such that at one time LEBERT believed in its spontaneous origin.† He explained in this way certain facts observed in the Crimean war, as its rapid and unexpected origin before Sebastopol with the occurrence of the cold damp season, its breaking out in a war vessel fifty days after her departure from Kamiesch, and many other sudden and unexpected outbreaks unconnected with any probable mode of importation or transmission from a previous case. Recently, however, he has changed his opinion, considering that these facts admit of another explanation: "Small quantities of typhus germs may have remained latent in these places, or their importation may have taken place from typhus regions by infected articles, which may have escaped the closest scrutiny." This change of opinion is not based upon any new information affecting the observed facts, but on a consideration of the inconsistency of a spontaneous origin with the doctrine of the germ theory. Will knowledge and lingering wisdom be reached in this way,—by assorting facts to secure uniformity to preconceived ideas,—or must we accept them as they are? Where, for instance, are we to look for the previous case that gave birth to the epidemic among the Salisbury prisoners on their liberation from the prison enclosure? If typhus fever existed at that time in the United States of America, the cases were few in number and confined to northern cities hundreds of miles from the place of captivity of these men, and separated from it by the lines of hostile armies. The confederacy itself was in fact at that time cut off from communication with the outer world as effectually as were its prisoners at Salisbury. These unfortunates were so thoroughly guarded against the intrusion of typhus fever that if the disease appeared among them, and there seems no doubt of the fact, it originated from causes that were in operation within the limits of their stockade.

At first sight it is difficult to say why the Salisbury prisoners should have been taken with typhus while those at Andersonville were spared. The condition and environment of both bodies of men were similar in character: Both were exposed to the inclemencies of the weather with scanty and ragged clothing, insufficient shelter and food: and both suffered in consequence. Both were filthy in the extreme and closely packed within their stockades. Both were similarly deficient in hospital accommodations. Patients died in camp in holes in the ground and were buried unknown to the hospital surgeons. Admission to hospital brought with it but little improvement in their mode of life: many of them had to lie on the floor or ground without blankets and without straw. But there was one important difference

* *A Textbook of Practical Medicine*, by A. L. LOOMIS, New York, 1884, p. 714. See also his *Lectures on Fevers*, New York, 1877, p. 212.

† See his article on the disease in the *First Volume of the American Translation of Ziemssen's Cyclopedia*, p. 306.

in the hospitals of the two camps: At Andersonville the hospitals consisted of some tattered tents and unfinished barrack sheds, roofed and floored, but open at the sides,—practically, the patients were in the open air. At Salisbury the hospital building consisted of a four-story brick factory and some smaller buildings formerly used as boarding-houses for the factory operatives,—practically, patients crowded into the rooms of these buildings were under the precise conditions that have so often been recognized as productive of typhus fever.

What the amount of crowding may have been if expressed in air-space per patient is unknown, and probably if known would be of little value, as the foulness of the air in a room occupied by a number of inmates depends more upon deficient ventilation than upon a few hundred feet of air-space more or less per man. In accordance with what is known of the management of these prison hospitals we may suppose that the floors of the rooms occupied by the sick were well covered. The point to be considered is, that during the cold winter weather of the occupation of the prison the shivering patients, without blankets, without even straw and with a deficient supply of fuel, would be more likely to stifle in the vitiated atmosphere that had been warmed by their own bodies than to throw open the windows and effect such a ventilation of the room as was possible. During the typhus epidemic of the Crimea the months of prevalence were those in which the soldiers shut themselves up in their quarters in seeking protection from the external cold; the months of decadence of the disease were those in which the weather conduced to free ventilation and an open-air life.

Whether the disease was generated in some of the prison-wards at Salisbury is of course unknown, but on this theory only can its subsequent epidemic development be explained. The fever might have caused frequent deaths among the inmates of an infected ward without attracting special notice, so great was the indifference of the Confederate authorities at these prison-pens to loss of life among their prisoners, and without spreading to the occupants of the enclosure, protected as they were from contagion by their open-air life; but when the prisoners were packed with these typhus foci on the trains which were to convey them to North East on the Cape Fear River, and were subsequently repacked on the small river boats for transmission to Wilmington, every facility was afforded the disease to spread from man to man and appear as a generally diffused epidemic on their arrival. Their subsequent distribution among the hospitals and barracks of Wilmington sufficiently accounts for the extension of the disease to the citizens and local garrison. Cases occurred among men who were considered fit to travel northwards to their homes; but as these made the journey in well ventilated and thoroughly appointed hospital transports the disease did not spread, although those primarily affected were delivered at David's Island, New York Harbor, suffering, according to Medical Inspector GEORGE H. LYMAN, U. S. A., from a disease which in its essential features resembled true typhus more than any other fever he had ever met with.*

On this view, not famine, filth nor overcrowding is the essential element in determining the evolution of typhus fever, but the concentration of the human emanations developed by those in confined and unventilated spaces.† There was no typhus in our Northern prisons

* See *supra*, page 333.

† JACQUOT, from his experience of the Crimean epidemic, was so strongly impressed with the spontaneous origin of typhus from a human miasm under such conditions as have been mentioned in the text that he wrote of the disease: *We can generate it at will.* "On peut faire naître le typhus à volonté, pour ainsi dire; rien de pareil pour la fièvre typhoïde."—*Du Typhus de l'Armée d'Orient*, Paris, 1858, p. 305. GUILLEMIN states that, contrary to the opinion commonly entertained, typhus occurred in the city of Metz during the siege of 1870. Physicians practicing there were almost unanimous upon this question; and some of them, who had formerly been in the army, had studied the disease during the Crimean war. It never became general nor assumed the gravity observed in the Crimea or Algeria for the sufficient reason that its causes had not been either so long in action or so intense. MÉRY is cited as saying: "I saw there (in Metz) the disease pursuing the same course that it followed on its apparition in the Crimea in 1854–55, and if the blockade had continued longer we should have had a second edition of the Crimean disaster."—See *The Practitioner*, London, Vol. XII, 1874, p. 231.

undoubtedly because the needful concentration was not effected. Our pavilion barrack-buildings, although generally provided with three tiers of beds and frequently affording only 200 cubic feet of space per man, had always some attempt at ventilation, usually by the ridge; and were, moreover, oftentimes satisfactorily ventilated by the very imperfections of their construction. Nevertheless, in many such overcrowded quarters a malignant character was assumed, especially by typhoid fever and acute malarial and pulmonary diseases, which obscured their clinical features and rendered their diagnosis from true typhus a matter of difficulty.* And in certain of these instances even the suggestion of a contagious quality was not wanting. It may, therefore, be claimed with some degree of plausibility that our typhus cases, or those that seemed to our medical officers to be typhus, did not require for their development the introduction of a specific ferment, poison or germ elaborated in the system of a pre-existing case of the disease, but were generated by a coalition of favorable conditions, of which the chief was overcrowding with deficient ventilation.

On this view, typhus as affecting the soldier should become an unknown disease. The measures to effect this are so obvious that their formal presentation is unnecessary.

VII.—TREATMENT OF THE CONTINUED FEVERS.

The functions of the Army Medical Officer are twofold. He is the Health or Sanitary Officer of his command charged with the duty of preserving the men in their best condition, that their aggregate, the military machine, may be enabled to exercise its maximum of power. From the governmental point of view this is the *raison d'être* of the military medical man. His duty as Sanitary Officer requires a careful supervision of the clothing, diet, shelter and labors of the men, that they may be protected from all avoidable influences of a pernicious character, including invasion by endemic or infectious diseases. But if, notwithstanding his efforts in this direction, disease should attack the command, he then becomes the physician in attendance on the individual case.

These functions, although distinct, are so intimately co-related that, as regards the continued fevers, the measures adopted for the protection of the command are oftentimes those best calculated to lessen the danger in individual cases; the prevalence and the fatality of an epidemic are frequently direct and proportionate results of the same insanitary conditions. The treatment of the continued fevers resolves itself therefore into a consideration of:

1st. Measures for the protection of the command against their introduction;
2d. Measures to restrict their spread and free the command from their presence;
3d. Measures for the relief and recovery of individuals attacked.

1st.—Preventive measures have already been indicated in discussing the etiology of these fevers. As protective against common continued fevers all unnecessary overfatigue and deprivation of sleep, exposure to excessive heat or chill, to contaminated soil or foul neighborhoods, the use of tainted articles of food and of impure water-supplies, should be especially avoided. Exposure to such influences is oftentimes inseparably connected with

* A similar malignancy was observed in the hospitals of Paris during the siege in 1870. Patients fell into a condition in many respects resembling that produced by typhus fever, and to this was due a considerable amount of the mortality among them. The published statistics of the siege contained no cases of pure typhus, nevertheless. "There is indeed much reason to believe that cases of pure typhus which did occur, instead of being shown separately in the returns have been included among the typhoid; and it may be fairly doubted if, during the continuance of the siege, the strict line of diagnosis between these forms of disease was drawn, as it usually is in England and doubtless would have been in Paris under normal conditions."—C. A. Gordon. *Lessons on Hygiene and Surgery from the Franco-Prussian War*. London, 1874, p. 285.

the duty on which the troops are engaged, in which case continued fevers and other diseases thus originating must be accepted as part of the price paid for the achievement of the military result. Usually the lists of killed and wounded pass current under this title, but these fail to give full expression to the price if sickness and mortality from disease be not incorporated. Nevertheless, with earnest medical officers and intelligent commanders, much unnecessary loss to the command may be avoided even in the most active of campaigns. Just as hastily constructed breastworks or rifle-pits are used to lessen danger from a hostile fire, so certain sanitary precautions should, even in the face of an enemy, be used for the protection of the men from diseases incidental to a campaign, whenever they can be applied without hazard to the military issues.

As has been seen, no exercise of sanitary supervision will be efficient at all times in preventing attack from typhoid fever; but much may be done in the way of protection by the avoidance of all communication with suspected foci or contaminated materials.

Nor can protective measures be in all cases efficient against the development of continued malarial fevers, although their frequency and gravity may be materially lessened by preventing unnecessary exposure at night, by filtering the supplies of water for drinking, and by using quinine as a prophylactic in movements involving conditions known to be specially dangerous.

Typhus fever, on the other hand, may be blotted from the list of camp diseases by excluding contagion and preventing the spontaneous origination of the disease. In camps and garrisons, and during service in the open field, the ordinary sanitary measures for the preservation of health will prevail against it, but during long-continued sieges troops in bomb-proofs and the civil population occupying basements and cellars will require active sanitary supervision to prevent an unnecessary disaster.

2d.—Measures to restrict the spread of febrile diseases and free the command from their presence have in view, under our present heading, only the typhoid and typhus infections.

In the case of typhoid, removal from the miasmatic locality is needful if the outbreak seems due to purely miasmatic influences. Removal is also required if the outbreak is due to a contaminated soil, as from a prior occupation by infected troops. If the place *must* be held, veteran regiments that have undergone their typhoid seasoning should be sent to occupy it. If the disease is attributed to an infected water-supply, a new source should be obtained, and until this is accomplished the suspected water should be used only after having been boiled;—filtration is untrustworthy as against typhoid fever. When the onset is less sudden, pointing to an accidental intrusion from other commands or localities, every new case as soon as detected should be removed from quarters to hospital, where its infectious material may be under medical control. Meanwhile obnoxious features in the sanitary arrangements of the camp should be obliterated. Its area should, if possible, be extended; any tendency to overcrowding in particular tents or huts should be obviated; tent floors should be exposed daily; infected sinks disused, and those in use disinfected daily lest they become contaminated by some new and as yet undiscovered case.

The typhous malignancy assumed by other diseases should undoubtedly have led to the removal of the unsanitary conditions which evoked it long before the continuance of those conditions could evolve a true contagious typhus fever. But in the event of the occurrence of such cases their removal to hospital, the abandonment of the infected site, or failing that, its thorough purification by aeration and an efficient system of personal and camp police,

together with strict attention to general hygienic laws, would certainly suppress the epidemic before it attained disastrous proportions.

3d.—It is well that so much can be accomplished from the sanitary or preventive stand-point. It offsets the incompetency of professional methods applied for the cure of the individual case. The clinical records and medical descriptive lists of the war are filled with notes of the treatment employed in cases of continued fever, but it does not appear that any systematic effort was made to determine the relative value of different methods. Patients died from exhaustion, diarrhœa, coma, peritonitis, hemorrhage, pneumonia, etc., while others submitted to the same remedial methods made a rapid recovery. Some progressed unfavorably for several weeks, but ultimately rallied from the most profound typhoid state and convalesced satisfactorily under treatment which, in other cases, did not prevent a suddenly fatal issue notwithstanding the seeming absence of all grave symptoms until the closing hours. Others recovered with no other treatment save that which protected them from harmful influences. In fact, the closest study of the records fails to show that the disease was influenced beneficially by any system of medication, or even that individual remedies had a notable effect on the result in individual cases. In many instances the administration of a certain medicine, a laxative, astringent, diaphoretic, calmative, refrigerant, antipyretic, etc., modified favorably for the time being the symptoms which called for its exhibition, but it cannot be shown that the ultimate issue of these cases was in any wise affected.

It must not be supposed, however, that professional care was valueless in the treatment of the continued fevers. Regulation of the diet in the late as well as in the early stages of the disease no doubt saved many lives by lessening intestinal irritation and promoting the cicatrization of ulcerated patches. The administration of suitable nourishment at regular times saved the strength of the patient. Watchful care and control during the period of delirium not only preserved the patient from direct and immediate accidental death, but prevented that involuntary violence of action and those unconscious exposures which would have tended to death by subsequent exhaustion or local congestive processes. The removal of retained urine by catheterization sometimes quieted delirium, relieved hypogastric pain and prevented local injury. Careful nursing economized the patient's strength by affording assistance in all his desired and permitted movements. The use of the bedpan certainly decreased the fatality of continued fever: Exhaustion was rapid in cases associated with active diarrhœa when, from want of facilities, the patient had to leave his bed on every alvine movement; moreover, sudden death was not uncommon among asthenic patients who made the effort to attend to their own necessities in this regard. Careful nursing also protected the fevered soldier during the night, when a pneumonic complication might have resulted from a continued displacement of the bedclothes; and by constant attention and frequent change of position and pressure, it prevented the development of exhausting and distressing bedsores, keeping the skin of the patient clean, his bedding fresh and the air in his vicinity comparatively pure.

Much was possible, therefore, independent of medication. Much, also, was accomplished. But it may be readily gathered from a perusal of the records that on account of crowded hospitals, overworked nurses and, in rare cases, defective discipline, everything that should have been done, and, indeed, in exceptional cases, everything that might have been done on behalf of the patient was not always effected.

In the field, facilities for the proper care of continued fever patients were not always at

hand. Nevertheless, it is believed that cases treated in the field hospitals, as when the army was in winter-quarters, did better than their comrades who were sent to well-equipped hospitals at the base of operations or in Northern cities. The superior comforts which surrounded the patient on his arrival at the general hospital failed to offset the injuries inflicted on him during the journey. This will readily be understood by those who have seen a wagon-train of sick soldiers en route to the rear. Suffering and danger assailed the patient on every hand. The hot sun and stifling dust of the summer were as dangerous as the cold rains or snows of winter. The irregular jolting over deeply-rutted country roads, and the continuous and intolerable agony caused by the passage of those that had been corduroyed, were enough of themselves to have transformed the headache of fever into its delirium. The innumerable occasions when the utmost strength of the patient was taxed to enable him to fulfil the necessities of existence under these conditions rendered him less able to withstand the hardships that had yet to be borne. Dietetic arrangements were generally imperfect; perhaps the only refreshment which the fever-stricken soldier was able to take during the journey was an occasional swallow of coffee from his canteen.* The transfer to rail or boat involved further efforts that increased his prostration. The tedium and exposures of this second journey, and the want of proper attention during the whole route, often brought him to his destination in a state of exhaustion, delirium or unconsciousness. Hence the imperfection of so many of the records of cases treated in the general hospitals; the previous history of the patient was unknown or received at second hand from some of his travelling companions.

From the mass of records relating to the treatment adopted in individual cases of continued fever there is little to be learned that may not be gathered from the articles on the treatment of typhoid fever by Wood, Watson and Bennett.† The works of these authors were, at the beginning of the war, on the Supply List of the Army Medical Department. Their doctrines were thus invested with official sanction, so far as this might with propriety be conceded in unsettled matters of a professional nature, and there is no doubt that they exercised the very strongest influence on the manner in which our soldiers were treated.

Wood was precise in his statement of the method of treatment to be adopted: Irritating matter must be removed from the bowels, but this must be effected by the gentlest of laxatives on account of the existence of a high degree of susceptibility to the influence of cathartic medicines. Bleeding was doubtfully suggested to prevent local and disorganizing inflammations, but the danger of injury to the system by induced debility was strongly set forth. Refrigerating diaphoretics were recommended as useful from the earliest period of the disease; citrate of potassa as a neutral or effervescing mixture was preferred, in conjunction with tartar emetic if the stomach and bowels were quiet, with some preparation of opium if these organs were irritable and with spirit of nitric ether if nervous symptoms began to appear; Dover's powder was approved for use at bedtime; sponging the surface with cold water or with alcohol and water was also recommended as a refrigerant. In addition local manifestations required treatment: Headache by cold applications or leeches; abdominal pain and flatulent distention by cupping, warm fomenta-

* If M. le Docteur Guillasse, Ancien Médecin principal de la Marine, fails to contribute much to our knowledge in his Essay *De la Fièvre Typhoïde. Etude Physiologique. Sa Nature—son Traitement*, Paris, 1878, he certainly furnishes some amusement to those who chance upon his pages in the progress of their study of the literature of the subject. He tells us that in the absence of other means of investigation he had recourse to methods which every thinking man may employ—analysis and induction—and he modestly submits his results that mankind may be the better for them if they are correct, or leave them in obscurity if they are erroneous. An erethism of the nervous system of animal life, occasioned and sustained by a certain congested state of the brain due to a stasis of venous blood in the capillaries of the organ, produces a spasmodic interference with the organic functions. This is all there is in typhoid fever, or, indeed, in any of the other essential fevers. In typhoid the spasm is manifested on the part of the liver by the secretion of an acrid bile, which occasions irritation, inflammation and perforation of the parts of the intestine with which it remains in contact for some length of time, as in the lower part of the ileum, where it finds an obstacle to its passage in the ileo-cæcal valve. The pathology having been determined to M. Guillasse's satisfaction, it remained for him to find an agent which, by removing this erethism of the brain and its consequent spasm of the nervous system of organic life, would permit the functions to resume their natural and healthy action. This he discovered in coffee. To cure typhoid fever it is only needful that "On donne deux ou trois cuillerées de fort café noir (je dis café et non pas chicorée), toutes les deux heures." After having administered the coffee he found to his great surprise that its action was as prompt as it was decisive. "En effet, à peine nos malades en eurent-ils pris quelques cuillerées que leurs traits se détendirent et qu'ils reprirent connaissance," etc. Our suffering soldiers en route to the general hospitals in the rear failed to realize the benefits, although certainly their coffee was the real article and not a chicory mixture.

† George B. Wood—*A Treatise on the Practice of Medicine;* Thomas Watson—*Lectures on the Principles and Practice of Medicine;* John Hughes Bennett—*Clinical Lectures on the Principles and Practice of Medicine.*

tions, emollient cataplasms, rubefacients or blisters; diarrhœa by opium and ipecacuanha with or without acetate of lead, kino, extract of rhatany or tannin; nervous symptoms by sweet spirit of nitre, Hoffmann's anodyne, camphor-water or opiates. In mild cases no other remedy than those mentioned was considered necessary; but in less favorable cases, when about the ninth day there was a loss of vital energy with no diminution in the violence of the disease, which was characterized by defective secretions and some degree of delirium, stupor and tympanites, mercury in small doses to affect the gums slightly was highly approved. Under its influence it was said that the tongue not unfrequently became moist, the skin relaxed and the symptoms generally ameliorated, the patient recovering without further treatment. The value of turpentine was also highly lauded. It was considered useful in all cases in the advanced stage of the disease, when the tongue was dry and the pulse not strong. In cases having the tongue red, dry and smooth, after or during the process of parting with its fur, and in which this was associated with an aggravation of the symptoms, notably of the tympanites, an amelioration of the patient's condition within twenty-four or forty-eight hours after a resort to the oil of turpentine was confidently predicted. Under its influence the tongue was said to become gradually moister, covering itself with a whitish fur; the tympanitic distention ceased to augment and after a time diminished; the pulse became less frequent; the skin less dry and harsh and the patient entered slowly but regularly into convalescence. Stimulants were recommended in the debility of the later stages and also in the earlier periods, when they were found on cautious administration to lessen the frequency and increase the fulness of the pulse, to relax the skin, moderate delirium, relieve nervous disorder and promote refreshing sleep. Wine-whey and carbonate of ammonia were suggested when a more diffusible impression was desirable. Quinine was recommended in small doses as a tonic. When collapse was imminent, powerful rubefacients, as hot oil of turpentine, cayenne pepper in brandy, diluted solution of ammonia, sinapisms and blisters were approved in connection with internal stimulation.

The treatment suitable to local affections or incidental complications was also indicated: Shaving and blistering the scalp in obstinate delirium and coma; musk, assafœtida and camphor in subsultus and jactitation; musk in singultus; acetate of lead, kino and extract of rhatany with opium in hemorrhage from the bowels; plugging the nares after the failure of astringent solutions or other measures in epistaxis; mucilaginous applications or the local use of silver nitrate or iodine in erysipelas; opium in peritonitis; the catheter in retention of urine; the mineral acids and vegetable bitters in exhausting night-sweats; and change of position, sponging with alcohol and water, and protection from pressure by pillows and lead plaster in threatening bedsores. Strict attention to diet was enjoined. At first all nourishment was required to be in the liquid form, as barley-water, rice-water, etc.; during the second week farinaceous preparations of gelatinous consistence were allowed; subsequently milk was permitted, and in the stage of prostration animal broths, eggnog, &c.

Watson discountenanced efforts to cure the fever by medication or powerful impressions on the system. His practice was to guide the fever and obviate the tendency to death, and the means he adopted to effect these objects were in general similar to those indicated by Dr. Wood. Among the remedies which in his opinion formed the staple of the treatment were: Cold to the shaven head; the local abstraction of blood whenever there existed unequivocal evidence of local inflammation; an active purge at first, and mild aperients afterwards, if the bowels were confined or sluggish; moderate astringents, as extract of catechu or Dover's powder, to control diarrhœa; opium in more efficient doses when nervous symptoms were prominent, particularly sleepless delirium and restlessness; in certain cases small and repeated doses of some mercurial, and in certain others *early* support by animal broths and even by wine. "The rational objects of treatment are to mitigate the urgency of symptoms that cannot be wholly subdued; to redress (so far as art may redress) those dangerous complications which are incidental but not essential to the disease; and to aid the conservative efforts of nature when these manifestly languish and fail." The tendency to death by asthenia was strongly impressed, and the danger of beginning the supporting treatment a little too early was set down as infinitely less than the risk of beginning it a little too late.

Bennett recommended the use of mild laxatives when required, cold to the head, salines, such as the acetate of ammonia with tartar emetic, and beef-tea and stimulants when the pulse became soft and weak although retaining its frequency. He considered active depleting measures as never useful and as seldom failing to increase the danger by lowering the vital powers. He believed that the disease might be aborted by the early use of emetics; and considered quinine incompetent in large doses to establish a cure and of doubtful value in small doses as a tonic.

One only of these authors, Professor G. B. Wood, adverted to the possible complication of the typhoid case by specific malarial causes, and suggested the treatment appropriate to this condition. His reference to this appears at the close of a paragraph devoted to a brief mention of certain special plans of treatment, as by emetics or bloodletting in the early stages, the use of nitrate of silver, alum, chloride of sodium, etc. He says:

When there is reason to believe that the disease is complicated with remittent or bilious fever, and especially when, under such circumstances, it terminates in intermittent fever, sulphate of quinia should be used without hesitation and with a freedom proportioned to the urgency of the symptoms.

From this casual reference it may be inferred that in civil practice before the war typhoid fever, notably complicated by the malarial poison, was of infrequent occurrence. But, as a rule for the guidance of our medical officers during the war, a paragraph similar

to that just quoted should have been placed at the beginning of every article on the treatment of the continued fevers. Typhoid, modified by malarial influences, instead of being the occasional or exceptional case, was the rule in our regimental epidemics, and among these modified enteric cases were plentifully scattered cases of pseudo-typhoid in which the clinical features of enteric fever were impressed on a purely malarial disease. Quinine, used without hesitation and with a freedom proportioned to the urgency of the symptoms, removed one of the febrile factors, after which the typhoid disease not unfrequently ran a mild course. The free use of this remedy was especially required where paroxysmal fevers were endemic, for in the early stages it was often impossible to say whether an individual case would ultimately prove to be enteric fever complicated by co-existing malaria, the latter susceptible of cure by quinine, or a remittent which, in the absence of specific treatment, would speedily fall into a dangerous condition characterized by typhoid symptoms.

The uncertainty attaching to the real nature of a case in which typhoid symptoms were developed led at first in some instances to a hesitancy in the treatment. Brigade Surgeon Jas. Bryan gives expression to this where he says that in North Carolina no two medical officers appeared to agree upon any plan of treatment for the continued fevers.* Surgeon Samuel Kneeland, 45th Mass., also referring to the fevers of North Carolina, stated that they were usually treated from the commencement with quinine, whiskey and beef-tea, but as the results of this method of practice were not satisfactory he pursued an expectant plan, employing refrigerants, diaphoretics, camphor and carbonate of ammonia.† At Fortress Monroe, Va., quinine was found inefficient in all the stages of the disease, and the treatment by emetics in the early period was instituted.‡ According to Dr. Thomas T. Smiley, a stimulant treatment was followed in the hospital at Hilton Head, S. C.; but the patients when received were already in the later stages of the disease, with the tongue dry, brown and cracked, and the pulse feeble.§ In the New York Hospital for Volunteers stimulants were freely given regardless of inflammatory complications.‖

But it would be unjust to the profession to assert that this uncertainty as to the proper treatment of the continued fevers was at all general or long continued. Indeed, at a very early period of the war the malarial complication of typhoid fever was recognized and appropriately treated by quinine. In December, 1861, Surgeon Rohrer, 10th Pa. Reserves, described a fever with rose-colored spots, which, in view of a malarial influence, he treated successfully with a mild purge of calomel, a large dose of quinine, fifteen to forty grains, during a morning remission, with calomel and ipecacuanha at intervals of four hours and turpentine when the tongue became dry.¶ In March, 1862, Surgeon C. J. Walton, 21st Ky., had already given expression to the principle on which was afterwards based the systematic treatment of the continued fevers of the army: As it is often impossible to determine at the beginning to what extent the case is influenced by malaria, it is well to begin with a few doses of quinine, when, if the fever be a malarial remittent, it will be controlled; but if it be enteric,—or, he might have added, a continued malarial fever in which secondary lesions are already established,—no specific action will be manifested.**

The Seminary hospital records, which have been presented as giving a full view of the clinical characters of the febrile cases sent to Washington from the army in the winter of

* *Observations on the Diseases of the Army in the Department of North Carolina.—Boston Med. and Surg. Jour.*, Vol. LXVI, 1862, p. 384.
† *Boston Med. and Surg. Jour.*, Vol. LXVI, 1862, p. 280.
‡ *American Med. Times*, New York, Vol. III, 1861, p. 380.
§ *Boston Med. and Surg. Jour.*, Vol. LXVII, 1862, p. 270.
‖ *American Med. Times*, New York, Vol. IV, 1862, p. 303.
¶ See his report, *supra*, page 318.
** *Supra*, page 316.

1861–62, subserve another purpose in illustrating the methods of treatment adopted. Moreover, as the records of this hospital do not differ in their general tenor from those of other large establishments of the same kind, the methods which they indicate may be accepted as illustrative of those in general use by our medical officers.

Although these cases were treated in the early period of the war, several months before the term typho-malarial was introduced to direct the attention of the profession to the complication of typhoid fever by the malarial poison, it is evident, from the frequent use of quinine, that this complication was already recognized. Certain cases that were brought in from the front along with the prevailing typhoid were recognized as remittent fever, cases 52–58 for instance, and treated successfully with mercurials, saline purges and quinine.* Certain cases, 113–120, regarded as remittent, but which presented more or less evidence of the co-existence of typhoid fever, were treated with antiperiodics in addition to the measures adopted in view of a possible typhoid.† Thus, in case 116, fifteen grains of quinine, six of blue-pill and two of opium were given in two doses separated by an interval of two hours, and were followed by four grains of quinine every two hours, while in 119 and 120 Fowler's solution was employed. Certain cases of typhoid fever, 59–112, in which intermittent or remittent paroxysms preceded or accompanied the symptoms of typhoid, or in which there was more or less evidence of the complication of the enteric fever by malarial influences, were treated with quinine before, during or after the exhibition of the remedies specially directed to the continued fever and its intestinal lesions. Thus, in 64, 94, 99 and 105, among others, quinine was given before the use of the remedial agents called for by the typhoid disease; in 78 and 79 it was given along with the remedies for typhoid, and in 74 and 75 it was tried after they had been in use for some time. Indeed, in some of the cases, 1–51, in which the evidence of a malarial complication was by no means strong, specific medication was employed in the effort to benefit the patient. Quinine was thus given in 8, 14, 17, 29, 38 and others in unstated quantities; in case 9 eight-grain doses were given three times a day; in 26 two grains every hour; in 44 twelve grains daily for several days, and in 49 five grains every two hours. In 30 the exhibition of this remedy was followed by a manifest but probably inconsequent improvement; in 41, on the contrary, an active delirium, which led to accidental death, supervened on the administration of twenty-four grains in twelve hours.

Surgeon S. K. Towle, 30th Mass., in his extensive experience of the fevers affecting the troops in the Mississippi Valley, recognized that many of the cases registered as typhoid were of malarial origin. These had not the rose-colored eruption, and, on admission to hospital, had already lost the early diagnostic features, retaining only the prostrated, semi-conscious condition of the last third of severe typhoid fever. Enteric fever itself was seldom seen in an unmodified form except in recruits recently arrived from New England. He considered it indisputable that all cases did better after the introduction of full doses of quinine into the treatment in the early stages, and that cases in which this remedy had not been employed at first were often benefited by its use in smaller doses at a later date.‡

A failure to recognize the malarial element in the typhoid case—no matter whether the case in question was a true enteric development or an adynamic sequence of a remittent or continued malarial fever—would have handicapped the physician in conducting the continued fever to a successful issue; but this was a fault in the method of treatment that was

* *Supra*, page 229. † *Supra*, page 246. ‡ See *supra*, page 313.

rarely observed although noted, as has already been seen, by Surgeon GEORGE A. OTIS, U. S. Army.* A failure, on the other hand, to recognize the typhoid element led sometimes to a persistence in the use of large doses of quinine which, while incompetent to effect a cure, may not have been in all instances free from injurious effects. As already explained, the febrile cases of the general hospitals were mostly enteric, while those that did not reach these hospitals, but terminated speedily in recovery or in coma and death in the regimental establishments, were in general due to malarial influences.† Quinine freely administered was regarded as essential to recovery in these cases. When a typhoid outbreak occurred in a regimental camp where the malarial factor was recognized as potent, some time usually elapsed before the enteric essential of the camp fever was distinguished, and during this period a failure to control the disease was attributed to inefficient specific medication in the early stages. Quinine under these circumstances was occasionally used with a freedom which was not continued after the presence of the unimpressionable typhoid element was appreciated. For instance, in the service of the 27th Conn. during the months of February, March and April, 1863,‡ cases 1–6, four of which terminated in death, were treated with fifty or sixty grains daily in repeated ten-grain doses; in case 2, two hundred grains were consumed in four days; in 5, two hundred and forty grains in five days; in 6, three twenty-five-grain doses in one day. But the intestinal lesion of typhoid fever discovered in the body of Dolph (case 330 of the *post-mortem* records) on March 20 put an end to this lavish administration of quinine.

Typhoid fever, whether in its pure or modified form, was almost invariably treated by what has been called the rational method. Efforts were made to restrain the violence of abnormal actions, to protect the patient against harmful influences, to support his failing energies until the febrile course had ended, and to rehabilitate his system after the attack. A few extracts from sanitary reports are herewith submitted:

Surgeon M. R. GAGE, *25th Wis., Columbus, Ky., March* 31, 1863.—At the outset the intestines should be cleared by an active purgative, and laxatives prescribed from day to day to keep them open if they do not act unaided; but when the vital forces are much depressed or the symptoms indicate ulceration of the intestinal glands, purgatives should be avoided, and if anything is required only the mildest laxatives should be used. Cold water is applied to the head by means of a linen rag frequently renewed. If there seem to be hepatic derangement, mercury is administered in alterative doses and with caution affecting the gums, but not pushing the remedy to salivation. If diarrhœa ensue or there be much nervous manifestation, Dover's powder may be prescribed with benefit; and if intestinal ulceration be diagnosticated fomentations to the abdomen and cupping are frequently beneficial, as also the internal use of spirit of turpentine. Effervescing draughts may be prescribed from time to time in this disease with good effect, allaying thirst and dissipating fever, except in cases troubled with diarrhœa,—and even in these, if a little Dover's powder be given to control the relaxed bowels, they may still be resorted to; solution of acetate of ammonia, weak lemonade and an occasional slice of orange do much to gratify the patient and no doubt prove serviceable by allaying excessive heat and that unpleasant dryness and parched condition of the mouth and throat so distressing to sufferers from fever. Bathing or sponging once or twice in twenty-four hours with water of a temperature which feels comfortable to the surface, and to which a small quantity of carbonate of soda has been added, is very grateful to the feelings and of some value in keeping the skin in a proper condition to exhale the poisonous matters so constantly and rapidly generated within the body. When the case is protracted and manifests increasing prostration of the vital forces resort may be had to beef-tea, wine, carbonate of ammonia, etc., to sustain the enervated and sinking powers.

Ass't Surgeon O. PEABODY, *23d Iowa, Rolla, Mo., Nov.* 30, 1862.—None of our purely typhoid fevers have spent their entire force upon the bowels, and we believe that we have diverted it from them by the avoidance of all active purgation in the progress of the disease. We have depended almost wholly on the very mildest of purgatives, sponging of the surface daily, citrate of potassa as a diuretic and diaphoretic, veratrum viride to control vascular action when necessary and, in the later stages, turpentine emulsion and wine freely with beef-tea. No case has been protracted beyond five weeks, three weeks being probably the average duration.

Surgeon PHILIP HARVEY, *19th Iowa, Springfield, Mo., Dec.* 1, 1862.—Fevers of a typhoid character have presented the usual symptoms, as dry tongue, sordes, tendency to stupor and diarrhœa with asthenia. In their treatment but little medication was employed: Saline effervescing draughts in the early stages, guarding against diarrhœa in the

* *Supra*, page 373. † *Supra*, page 249. ‡ See *supra*, page 250.

progress, and moderate venous stimulation in the decline constituted the method of cure: and its results were satisfactory.

Surgeon C. W. STEARNS, *3d N. Y., Fort McHenry, Md., Jan.* 1, 1862.—Experience in the course and treatment of typhoid fever in this region has been very instructive. Eliminating remedies, all of which belong to the class of depressents, if used at all, must not be continued beyond the first or second day, after which a tonic and stimulant course must be begun and continued with little regard to local symptoms or complications. The truth of this has been illustrated in the opposite results of two recent cases of typhoid pneumonia: In the first, that of Corporal Kessler, I could not resist the temptation to employ some simple and not very depressing remedies to relieve cough, pain and other pulmonary symptoms. The patient died. In the second, that of Private Martin, the chest symptoms were even more urgent and distressing, but I resolutely abstained from prescribing any of the so-called *appropriate* remedies, continuing instead the frequent use of stimulants and tonics. He is now recovering. Two other cases may be mentioned as of interest: Private Morgan, with typhoid fever characterized by all the worst symptoms, as coma, subsultus, involuntary discharges, a dark cold surface and some rigidity of the muscles, is now, under stimulant treatment, nearly well enough for duty. Corporal Hagelote had, as a sequel of remittent fever, an enormous œdema of the scrotum and prepuce, which terminated in sloughing of the integuments so that the testicle and body of the penis were left wholly bare. Hectic, with numerous small abscesses, supervened. Yeast poultices, with charcoal, tincture of iron, porter and good diet were employed in due course, and the patient is now regaining flesh and strength, while nature is rapidly replacing the lost integument.

Surgeon R. W. HAZLETT, *5th West Va. Cav., Elkwater, Va., Oct.* 1, 1861.—Typhoid fever predominated in September. Our success in its treatment is attributable to careful nursing rather than to medication. Supporting diet with judicious stimulation has restored many unfavorable cases.

Surgeon W. H. THAYER, *14th N. H., Orfutt's Cross Roads, Md., January*, 1863.—The proportion of fatal cases of typhoid fever was large although the general character of the fever was mild. Death occurred in one case from profuse intestinal hemorrhage and in another from exhausting diarrhœa: in neither of these was there any cerebral disturbance. In three delirium was the principal symptom, continuing until death in the second week. Rose-spots have not been found in all cases and only in a few instances have they been abundant. Œdema of the extremities followed the fever in four cases. Sulphate of quinia or of cinchonia has been employed in every case,—in mild cases the former in three-grain doses daily, or the latter in twelve-grain doses, has been the sole medical treatment. The quantity administered has depended upon the severity of the case: sulphate of quinia having sometimes been given to the amount of twelve, twenty or even sixty grains daily. When there was great debility whiskey was employed, or brandy if urgent diarrhœa was present. When, in addition to debility, there was much pulmonary congestion or extensive bronchitis, carbonate of ammonia was also exhibited in frequently repeated doses. Beef-juice and milk were given as nourishment. Convalescents were fed on beef, eggs, milk and bread. Diarrhœa was met with opiate injections: a drachm or a drachm and a half of laudanum usually checked the evacuations for about twelve hours, and in some cases after two or three administrations the intestinal condition became apparently much improved. Sinapisms were employed for the relief of abdominal pain. Roasted apple was allowed to every patient. Latterly cold tea has been used instead of water as a drink, on the suspicion that the water of this region produced a tendency to diarrhœa. One case deserves particular mention: J. M., age 20, in the third week of typhoid began to fail on account of the severity of the diarrhœa. About the eighteenth day he vomited everything and assumed a cadaverous look, his eyes sunken and surrounded with dark areolæ and his extremities cold. All attempts to administer food or medicine were discontinued. After some hours fasting the vomiting ceased and the patient began to take champagne in half-ounce doses. This was continued three or four times an hour until the one small bottle that had been procured was finished: after this cider was given, two or three ounces every hour for thirty-six hours. Then we ventured on beef-tea in small quantities, and on the fourth day gave milk, with a little hard bread on the following day. There was no subsequent vomiting: the patient improved slowly from the day after the change took place. After five days of constipation an enema brought away an abundant and well formed detection. Thirteen days have now elapsed since he began to improve and no untoward symptom has appeared. He sits up a little daily: his food consists of eggs, beefsteak, milk, apples and bread and tea. No medicine has been employed during his convalescence, and the cider has been discontinued for several days.

Surgeon J. T. CALHOUN, *74th N. Y., Camp Kearny, Alexandria, Va., Oct.* 10, 1862.—The treatment consisted of a mild cathartic at the outset, followed by diaphoretics; as soon as the debility characteristic of the disease showed itself stimulants were given freely,—quinine, whiskey and wine of turpentine were used with turpentine frictions to the abdomen. When cerebral disturbance was troublesome Hoffmann's anodyne was mostly relied upon. With the stimulants a rich diet was allowed: beef-tea, eggnog, milk punch and oyster or chicken soup,—but, although we had a large hospital fund, it was often difficult to follow out this line of treatment. The unfriendly inhabitants refused to sell to us, and communication with the outside world was indirect and uncertain. The scanty allowance of alcoholic stimulants permitted in the field fell a prey to the teamsters during its transit from Washington, and we had to depend for our supply upon liquor confiscated from trading sloops which carried on an illicit trade with the soldiers. Oysters we could generally procure and oyster soup was a standby. Eggs were bought at fabulous prices when obtainable. No less than three of my patients died after the establishment of convalescence because proper food could not be provided for them during a temporary suspension of fresh-meat issues.

Surgeon R. N. BAER, *39th Ohio, Summerville, Va., Nov.* 1, 1861.—There has been a comparatively large number of fever cases, and what is peculiar, every case of illness of whatever character specially assumed a typhoid form and yielded slowly to treatment. In most cases my reliance is on quinine, whiskey or brandy in large and repeated doses.

When I diminish or omit these remedies my patients rapidly sink exhausted. The epidemic, for such it is, does not appear to have reached its climax, nor is it confined to the soldiery, but affects also the inhabitants of the surrounding country. * * * The season has been unusually wet; drenching rains have fallen for days together. Resident physicians ascribe the epidemic to this cause and look confidently for its disappearance when cold weather sets in.*

Attempts to suppress or favorably modify the disease by emetics in the early period were rarely made. A few instances of this kind may be found in the service of the 19th Mass., cases 3, 4, 10 and 12.† The plan appears to have been tried also at Fort Monroe, Va. Usually, however, on the arrival of a fever patient at a general hospital the first means adopted to promote his well-being were, in the absence of peremptory indications for other measures, a much-needed bath and a full dose of Dover's powder. These, with a few hours of rest and quiet, perhaps of sleep, tended to free the case from much of the temporary excitement or exhaustion due specially to the fatiguing journey from the front.

The relaxed condition of the bowels, so intimately associated with the essential lesion of typhoid fever, was frequently held in check by the Dover's powder or other opiate administered as an anodyne, calmative, sudorific or hypnotic. Enemata of starch and laudanum and pills of acetate of lead, tannin and opium were favorite remedies when diarrhœa was active and threatening. The use of the former may be noted in cases 27, 62 and 97 among others of the Seminary series; of the latter in 18, 45, 47 and 86 of the same series, and in 51 of the *post-mortem* records; chalk mixture was employed in case 11 of these records, nitrate of silver and opium in 35 and subnitrate of bismuth in 85; catechu in 32 and 46 of the Seminary series.

But although the pathological tendency was to diarrhœa few of the cases ran their course without being subjected at some period to the action of laxative or active purgative medicines. In case 38 of the Seminary records the object of the cathartic was apparently to allay cerebral congestion, and in 13 repeated doses of castor oil and extract of senna were administered on account of headache and dizziness towards the favorable close of the case; but in most instances the movement of the bowels was the primary object in the exhibition of laxative or cathartic medicaments. Sometimes this was effected by enemata, as of soapsuds in 36, 46 and 85. In 29 no stool was obtained without the aid of castor oil except on the day of admission. In 8, 9, 13, 15, 38, 39, 62, 63, 67, 73, 75 and 108 such cathartics as calomel, jalap, compound cathartic mass, blue-pill and sulphate of magnesia produced no undue effects, although in some of these, as 73, increased tenderness of the bowels was noted after the administration; but, on the other hand, the benefits derived or expected to be derived from their use are not clearly indicated. Moreover, in case 6 there was no prominent abdominal affection until after the administration of castor oil; in 79, also, an exhausting diarrhœa followed the use of this laxative agent. In 21 two six-grain doses of calomel were followed by diarrhœal stools, with much abdominal tenderness and tympanitic distention; in 103 calomel and jalap induced frequent evacuations which were associated with acute abdominal tenderness. In case 8 of the record of the 27th Conn. three compound cathartic pills gave rise to eight small bloody passages, with pain in the right iliac and epigastric regions, and an ounce and a half of sulphate of magnesia, subsequently administered, induced six copious watery evacuations. The patient recovered; but it is difficult to conceive in what manner this irritant action on the already inflamed and ulcerated mucous membrane of the intestine contributed to the favorable result. In fact, the claims of active cathartics to a place in the rational mode of treatment of typhoid fever do not appear from the records to be well grounded.

* See *Report, supra*, page 327.

† See *supra*, pp. 255–257.

As directed against the complexus of symptoms constituting the febrile condition ipecacuanha and opium, in the form of Dover's powder, was generally employed. Usually it was given at bedtime to induce a restful night. Sometimes in mild cases no other treatment was prescribed, as in the typhoid left after the suppression of the malarial element in case 109. Occasionally, as in 86 and 110, sweet spirit of nitre was used to supplement the effects of the Dover's powder. To these a saline solution was sometimes added—the acetate of potassa, as in 107, or the corresponding ammonia salt, as in 38, 99 and 119. Camphor was used with the ethereal spirit in 25; digitalis in 49, and veratrum viride in 105, in which the pulse was frequent, quick and strong, with pulmonary inflammation threatening. Nitrate of potash was used to control the febrile action in some of the cases that occurred in the 19th Mass.; tincture of aconite in 65 and 68 of the *post-mortem* records.

Small doses of mercurials, usually calomel or blue-pill in conjunction with opium, were given in many cases, as 82, 83 and 85, for a few days at a time, evidently with the view of controlling the deposits in the intestinal and mesenteric glands; in 99, 100 and 105 these were combined with quinine, and in 84, 90 and 101 with antimony; but so far as shown by the records the constitutional effects of the remedy were not produced in any of these cases. In 123 liquid effusion in the pericardium or pleura was promptly absorbed on the occurrence of salivation. Ptyalism in case 17 of the *post-mortem* records did not prevent death from perforation of the ulcerated patches. In some cases in which jaundice appeared as a symptom, as in 121 of the Seminary series, small doses of calomel and opium were administered; in others, as in 67 and 112, blue-pill and quinine constituted the treatment.

Cold was applied to the head by means of wet cloths when headache was violent or in the presence of cerebral hyperæmia, as in cases 36 and 38. Sometimes, as in 257 of the *post-mortem* records, blisters were applied to the back of the neck to counteract the effects of intra-cranial congestion. Sponging the body with tepid or cold water was frequently employed as a means of reducing febrile heat and conducing to the comfort of the patient. The reports of Surgeons WALTON,* GRANGER† and READ‡ refer to the beneficial results of this practice. In case 46 muscular pains in the limbs are said to have been relieved by sponging the surface with alcohol.

Turpentine was as extensively used as if it had been considered a specific in typhoid fever. Generally it was given when the tongue became dry and brown, and particularly when this organ was dry, red and glossy, or when the abdomen was tympanitic and tender. It was administered in doses of ten or fifteen drops, repeated every three or four hours; an emulsion made with gum arabic, sugar and cinnamon-water was frequently prescribed. Its use was continued only for a day or two at a time; but in case 268 of the *post-mortem* records it was employed for eight consecutive days.

Some medical officers have expressed much satisfaction at the favorable results obtained by the administration of this remedy.§ The frequency of its use also testifies to a high estimation of its virtues. But when the individual cases that have been presented in this chapter are examined with reference to this point the beneficial effects of the remedy do not appear to be so definitely established. Notes of the administration of turpentine are found in seventy-two of the cases already presented from the clinical records of the Seminary hospital, the 19th Mass. and 27th Conn.; but the records of some of these are so imperfect in their

* *Supra*, page 316. † *Supra*, page 317. ‡ *Infra*, page 547.

§ See, for instance, the report of Ass't Surg. J. C. MCKEE, U. S. Army, *supra*, p. 60.

details of progress that, although the cases terminated favorably, they cannot be admitted as evidence of the value of the remedy. On account of similar imperfections the records of fatal cases cannot be used to testify to the inefficacy of the remedy,—the treatment by turpentine was in some instances begun such a short time before the fatal termination that their records cannot with propriety be considered in an investigation of this nature. It seems proper, also, to exclude cases in which the mildness of the attack gave no opportunity to emphasize the action of the medicine, as well as those which, although grave in their general aspect, did not present a high development of the symptoms which the oil of turpentine was assumed to control. On these grounds twenty of the seventy-two cases may be dropped from consideration.

Some improvement was observed to follow the use of turpentine in nineteen of the remaining fifty-two cases; no improvement in thirty-three. But it is questionable if the alteration in the condition of the patient can be with propriety attributed to this particular medicine in all the cases in which the symptoms were favorably modified subsequent to its use. When the improvement in a febrile case is general and not confined to the condition of a particular organ or set of symptoms its cause must be ascribed to influences affecting the system as a whole. A remedy directed to a specific object may not be credited with a local beneficial result which would have happened irrespective of it as a part of a general effect. It will be shown hereafter that turpentine had no influence on the cerebral symptoms of typhoid fever. When, therefore, in a case of this fever the administration of turpentine for a dry glazed tongue and tympanitic abdomen was followed by relief not only to these conditions but to all the other symptoms of the complex febrile state, the local improvement must be regarded less as the effect of the remedy than as a part of a larger effect produced by some general influence, as a crisis or lysis at the natural termination of the febrile attack. Probably in at least seven of the nineteen cases in which favorable results followed the use of turpentine a doubt may be reasonably entertained as to the cause of the improved condition: these are 15, 19, 38, 40, 68, 71 and 86 of the Seminary series.

There remain, therefore, but twelve cases, 22, 27, 31, 36, 44, 45, 51, 93, 99, 113, 114 and 119 in which an improved condition of the tongue or an amelioration of the intestinal symptoms may be attributed to the internal administration of the oil of turpentine; and even these are not without qualification: In some, as 27, 45 and 119, the improvement may have been in a measure due to the astringent remedies given at the same time; in some, as 36 and 93, the relief was but temporary, the intestinal symptoms recurring at a later date; and in one, 113, the connection between the condition of the skin and the presence or absence of diarrhœa appears to have been decidedly more intimate than that between the intestinal symptoms and the administration of turpentine.

To offset these there are among the fifty-two cases thirty three in which the details, given with precision, discountenance the idea of a beneficial effect from the turpentine treatment. In twenty-four of these the abdominal symptoms persisted or became aggravated after the administration of the remedy, and in nine they were actually developed shortly after its use. These are particularized in the subjoined analysis.

Similar results are obtained from a study of the cases submitted as the *post-mortem* records of the continued fevers. In seven only of this large number of cases was some improvement noted after the use of turpentine. In one, case 96, the remedy is said to have disagreed with the patient. In thirteen cases in which a reference to turpentine has been

preserved in the published records, by way of keeping in view the nature of the medication adopted in these cases, no intimation of a favorable change can be drawn from the statements given. In many others in which references to the treatment have been suppressed in the published records as valueless by reason of their isolation from unrecorded correlated facts, nothing is shown by the original papers except that although turpentine was used at some stage of the malady the ultimate result was death.

The absence of any restraining influence exercised by this remedy on symptoms unconnected with the intestinal canal may be readily gathered from an examination of the cases: In 22 delirium continued for six days after diarrhœal symptoms had subsided subsequent to the use of turpentine. In 23 delirium supervened on the day after turpentine was administered, and persisted for eight days thereafter. In 24 all the symptoms that are usually regarded as unfavorable prognostics, excepting those connected with the local lesion—as exhausting diarrhœa, intestinal hemorrhages and indications of peritonitis from perforation of the gut—were present for nearly two weeks after turpentine was used. Among other instances of the continuance of cerebral symptoms cases 28, 32, 84, 87 and 97 may be specially mentioned.

ANALYSIS OF CASES OF CONTINUED FEVER IN WHICH TURPENTINE WAS USED TO MODIFY THE CONDITION OF THE TONGUE OR MITIGATE THE URGENCY OF INTESTINAL SYMPTOMS.

*Cases in which an improved condition of the tongue or an amelioration of the intestinal symptoms may be attributed to the internal use of the remedy.**

CASE 22.—The tongue cleaned and diarrhœa subsided within four days after the remedy was used, but febrile delirium continued for six days longer.

CASE 27.—When turpentine was given in this case the patient was muttering in the delirium of typhoid, his tongue brownish-gray in the centre, red at the tip and margins and his bowels loose and tender. Two days later the tongue was cleaning as part of a permanent improvement: but opiate enemata were used in conjunction with the emulsion on behalf of the intestinal symptoms.

CASE 31.—Turpentine given late in the disease, when the tongue was dry from pulmonary complications, was followed by an improvement in the patient's condition.

CASE 36.—The tongue became moist and the tympanites diminished after the administration of the remedy on the twentieth day; but diarrhœa, involuntary stools and abdominal tenderness were noted at a later date.

CASE 44.—A moistening of the dark-colored tongue followed the use of turpentine, but otherwise the symptoms appeared unchanged.

CASE 45.—Diarrhœa and meteorism, treated with turpentine on the ninth day, became relieved in a few days, and the bowels thereafter remained quiet or with not more than one movement daily; but acetate of lead, tannin and opium were used coincidently.

CASE 51.—Treatment by turpentine, support and stimulation was followed by a subsidence of diarrhœa and return of appetite.

CASE 93.—A temporary improvement, involving the disappearance of meteorism and of the fur from the tongue, followed the use of the remedy; but diarrhœa continued, and the case terminated fatally with hemorrhage from the bowels and laryngeal and pulmonary inflammatory complications.

CASE 99.—In this case the tongue was dry, and although the bowels were quiet there was some tenderness and meteorism. After the use of turpentine the condition of the tongue remained unchanged, but an improvement was manifest in the cerebral and abdominal symptoms.

CASE 113.—Diarrhœa subsided temporarily after the use of turpentine, but abdominal tenderness and distention persisted. In this case the connection between the condition of the skin and the presence or absence of diarrhœa appears to have been more intimate than that between the intestinal symptoms and the administration of turpentine.

CASE 114.—Relaxation and tenderness of the bowels, which appeared in the list of symptoms before the use of turpentine, were not noted after its employment, although the general symptoms continued grave for some time.

CASE 119.—Diarrhœa was controlled but tenderness and distention continued. Acetate of lead, tannin and opium were given at the same time.

Cases in which a favorable modification of the symptoms following the use of turpentine may with propriety be suggested as due to other coincident conditions.

CASE 15.—Two days after the institution of the treatment by turpentine the tongue was cleaning and the bowels, although slightly tympanitic, were quiet and free from tenderness; but as this occurred at a somewhat late period of the attack and was gradually followed by convalescence, the probability of a natural lysis is suggested.

* When not otherwise stated the cases cited are from the Seminary hospital series.

Case 19.—The defervescence which took place two days after the use of turpentine was probably a natural crisis by perspiration.

Case 38.—The dry, hard and fissured tongue became moist and clean after turpentine was administered, but the general character of the improvement suggests a natural defervescence.

Case 40.—The improvement following the use of the remedy may be attributed to the subsidence of the pulmonary inflammation which preceded the attack of typhoid. The tongue became dry and brown and the bowels tender though not very loose in the subsequent febrile course.

Cases 68, 71 and 86.—The general character of the improvement, and the period at which it took place, raise a doubt as to its causative agency.

Cases in which the records do not show that any beneficial effect resulted.

In cases 78, 82, 95, 100 and 117 the want of precise details of the progress of the disease prevents the beneficial effects of turpentine, if any were exercised, from being known.

In cases 42, 48 and 91 of the Seminary series, and in 13 of the 19th Mass., the institution of the treatment by turpentine was so delayed that the speedy approach of death prevented any manifestation of its assumed remedial powers.

Case 18.—When turpentine was given, on the eighteenth day of the attack, the patient was much exhausted by night-sweats; his tongue was dry and brown, but he had no diarrhœa. The record does not show that any improvement resulted.

Case 32.—Turpentine certainly did not exercise any favorable influence on the cerebral symptoms in this case; nor is it clear from the record that the diarrhœa, borborygmus, tenderness and tympanites were immediately relieved.

Case 80.—The remedy was administered after the abdominal symptoms had ceased to be distressing.

Case 104.—No special action of the turpentine can be inferred from the record. Perhaps the large quantity of urine passed during the twenty-four hours immediately succeeding its administration may have been due to its diuretic action; but that any favorable impression was made on the intestinal symptoms is doubtful, as a blister was applied to the abdomen on the seventh day after the emulsion was prescribed.

Cases in which it is difficult to assign a favorable action to the turpentine on account of the want of gravity in the abdominal symptoms for which its use is recommended.

Case 7.—The tongue was red, smooth and glossy; the teeth blackened; some abdominal tenderness and gurgling was present but no meteorism. Turpentine was given on the ninth day and convalescence established on the fifteenth.

Case 13.—The abdominal symptoms were prominent neither before nor after the use of turpentine in the third week of the attack.

Case 14.—A light febrile case which, though of some duration, did not present any of the indications mentioned by Professor Wood as calling for the use of turpentine.

Case 23.—Delirium supervening on the day after the turpentine treatment was commenced continued for eight days, but the abdominal symptoms were not prominent.

Case 24.—This case, after admission on the twenty-second day of the disease and the institution of the turpentine treatment on the following day, presented a series of grave symptoms—including delirium, unconsciousness, sordes, dilation of the pupils, floccitatio, subsultus, inability to articulate, otorrhœa, bedsores and vibices—that did not subside until the thirty-fifth day, when a less frequent pulse, cleaning tongue, returning intelligence and moist skin indicated the commencement of convalescence.

In 60 and 110 the abdominal symptoms were so mild that the influence of turpentine as a remedial agent cannot be determined from the records.

Cases in which diarrhœa or other abdominal symptoms persisted or became aggravated after the use of turpentine.

Case 25.—Frequent stools, sometimes passed involuntarily, delirium, sordes, etc., persisted for many days after the use of the emulsion.

Case 26.—This case presented a red, dry and glossy tongue, diarrhœa of some frequency, much meteorism, but no tenderness. These symptoms persisted for a week notwithstanding the administration of turpentine, stupor and delirium meanwhile supervening, the tongue becoming dry and dark and the teeth covered with sordes.

Case 28.—Diarrhœa, abdominal tenderness, gurgling and meteorism appear to have been as distressing after as before the use of the remedy. Not until three weeks afterward did the cerebral symptoms subside, and with them the manifestations of the intestinal lesions.

Case 29.—Tenderness and tympanites in this case do not seem to have been favorably modified.

Case 34.—The tongue was dry, fissured and brown-coated, the teeth covered with sordes and the abdomen tympanitic when turpentine was given. No notable change followed until eight days later, when the tongue cleaned and delirium subsided.

Case 37.—This was characterized by two passages daily, with slight tenderness and gurgling; tongue brown in the centre, its margins red. Turpentine did not effect any change in these conditions.

Case 43.—There was much tenderness, some tympanites, little diarrhœa and a moist tongue, coated except at the edges. After the use of turpentine the tongue became dry and the intestinal symptoms persisted, if, indeed, they did not become aggravated.

Case 46.—Turpentine was used on the seventeenth day, the bowels at the time being loose and tender, the tongue smooth and dry in the middle and moist at the edges. Next day the bowels were quiet but meteorized and acutely

tender. The tenderness persisted on the nineteenth day, but the tympanites was reduced and the bowels relaxed, an enema of soapsuds having been administered meanwhile. On the twenty-first day the tongue was smooth, glossy and dry, and the bowels loose, tender and meteorized. The tongue did not become clean until the twenty-sixth day.

CASE 47.—No improvement resulted from turpentine administered on the seventh day; for the grave symptoms, including diarrhœa, were not relieved until five days later, when the tongue became moist and began to clean in patches.

CASE 50.—Turpentine was not beneficial in this case, for from the time of admission the condition of the patient gradually changed for the worse, the stools becoming involuntary and the prostration extreme.

CASE 64.—When remitting fever gave place to a continued form in this case turpentine was substituted for quinine, the patient having a dry tongue and frequent stools. Its further progress was marked by abdominal symptoms, which appeared rather to alternate with perspirations than to indicate the influence of any special medication.

CASE 70.—Severe diarrhœa and abdominal pain persisted for ten days after turpentine was prescribed on the seventeenth day.

CASE 74.—Turpentine was given on the eleventh day for intense abdominal tenderness. From this time to the end of the fourth week the patient's general condition remained unchanged; his tongue flabby and yellow-furred; bowels moved from one to seven times daily, with general and occasionally umbilical and left iliac tenderness, and with sometimes slight tympanitic distention.

CASE 75.—Turpentine was given on the eighth day; but for several weeks after this there was a notable relaxation of the bowels, with more or less tenderness, chiefly in the umbilical and left iliac regions.

CASE 77.—Involuntary diarrhœal stools, abdominal tenderness and distention, with a dry, brown tongue and sordes, persisted for a week after the use of turpentine.

CASE 81.—The beneficial effects are not manifest in this case, as subsequent to the use of the remedy sordes appeared on the gums, the stools were passed involuntarily, and eight days afterward the tongue was dry and tremulous and the bowels loose.

CASE 84.—After turpentine was given cerebral symptoms were manifested, while diarrhœa and tympanites appear to have been aggravated. Treatment was complicated by the administration of calomel, opium and antimony.

CASE 87.—For three days after turpentine was used there was but little improvement; diarrhœa continued, cerebral symptoms were developed and afterward pulmonary inflammation.

CASE 90.—Intestinal and cerebral symptoms persisted for nine days after the use of turpentine.

CASE 97.—Diarrhœa was aggravated and cerebral symptoms developed after the use of turpentine, all leading to a fatal result thirteen days later.

CASE 111.—The intestinal symptoms do not appear to have been favorably modified by turpentine; tenderness or looseness of the bowels was noted on the days following the use of the remedy.

CASE 118.—On the third day after the administration of turpentine the condition of the patient remained unchanged. At this time an enema of castor oil and turpentine relieved the tympanites.

CASE 7, 19th Mass.—The frequent but bloody and scanty stools which characterized this case were not favorably modified nor were the general symptoms alleviated.

CASE 4, 27th Conn.—Following the administration of turpentine for abdominal distention the tongue, which had been somewhat moist, became dry, cracked, dark and bloody; tympanites was not relieved until six days later.

Cases in which intestinal symptoms were developed strikingly after the administration of turpentine.

CASE 6.—The remedy was given as the eruption appeared, the tongue being dry in the centre but moist at its edges, and the patient having had no diarrhœa, tenderness or tympanites. Two days later the tongue became red, dry and glossy, and diarrhœa with umbilical pain was developed, castor oil having been administered in the meantime.

CASE 16.—The tongue was dry, red and glazed, and the bowels quiet when turpentine was given, but the further somewhat prolonged progress of the case was characterized by diarrhœa of three to five stools daily, meteorism, and right iliac, umbilical and general abdominal tenderness.

CASE 21.—Turpentine did not prevent the occurrence of three or four stools daily, with much abdominal tenderness and tympanites, which, however, may have been due to medication by calomel and not alone to the morbid processes induced by the febrile poison.

CASE 69.—Four days after the use of turpentine diarrhœa appeared as a prominent symptom, speedily associated with tenderness, especially acute in the right iliac region.

CASE 79.—In this case, as in 6 and 21, the effects of turpentine were complicated by the use of purgative remedies.

CASE 94.—A fatal issue, with much diarrhœa and meteorism, was not prevented.

CASE 96.—All the grave symptoms in this fatal case were developed after the administration of turpentine; but the intestinal symptoms were not prominent.

CASE 101.—A few days after turpentine was administered for intestinal distention diarrhœa was developed, which continued for more than a week, associated with pain in the epigastric region and gurgling in the right iliac fossa and along the track of the colon.

CASE 116.—Two days after the use of turpentine the bowels, which had been quiet, became loose.

TURPENTINE IN THE CASES OF THE POST-MORTEM RECORDS.—The notes of treatment in many of the cases submitted as *post-mortem* records were omitted in preparing the cases for publication; but they were retained in every instance in which they were recorded with precision and also in several in which they merely indicated the method adopted.

No intimation of even a temporary improvement from the use of turpentine is found in the records of 10, 11,

35, 40, 78, 83, 89, 95, 111, 247, 248, 258 and 264, or in any of those in which the references to treatment have been suppressed as valueless.

In 96 turpentine is said to have been tried, and discontinued on account of disagreeing with the patient.

In seven cases some improvement was noted, as follows: 17.—The dry, red and glazed tongue became moist and sordes disappeared, but death was precipitated by perforation of the intestine. 43.—The dry, dark, cracked and glazed tongue, sordes, diarrhœa, abdominal tenderness and tympanites were favorably modified by the use of turpentine for about three days, when fatal pneumonia supervened. 79.—The patient suffered from typhoid delirium; tongue dry, red and gashed; bowels loose and tympanitic. After the use of turpentine the tongue became moist and the bowels checked, but diarrhœa suddenly recurred and death took place in a short time. 88.—Progress was favorable under turpentine until abdominal pains set in a few hours before death by coma. 105.—A temporary improvement, the nature of which is not precisely stated, resulted from the use of quinine, turpentine and stimulants. 117.—Under the influence of small doses of emulsion of turpentine and laudanum delirium subsided, the tongue became somewhat moist and the pulse less rapid, but diarrhœa was subsequently established. 268.—Under the use of turpentine, continued for eight days, tympanites subsided and the tongue began to clean, but a fatal stupor came on at a later date.

In case 300 the tongue, notwithstanding turpentine, continued red and dry for several weeks.

The testimony on behalf of turpentine is not encouraging; nor is this unexpected when the pathological conditions are held in view. The tenderness and tympanitic distention of the intestine and that dry and dark or scaling and glazed tongue which, in accordance with army practice, suggested the use of the remedy, were generally associated with extensive ulcerations that admitted of no sudden reparation and return of the affected parts to a healthy state. A mitigation of the urgency of distressing or dangerous symptoms was all that could be hoped for under the conditions. This was sometimes obtained. Hence it is probable that, were these cases to come up anew for treatment at the present time, turpentine would be as generally used as in the past, in the absence of any more trustworthy method of exercising a salutary influence on the sloughing or granulating patches of the affected mucous membrane.

That part of the rational method of treatment which looked to the support of the failing energies of the system became, in many cases, of so much importance that in practice it ceased to be known as a part of the expectant plan. It became the supporting or stimulant method of treatment. In some mild cases its use was unnecessary. Few, however, of the serious or protracted cases reached their termination without undergoing systematic treatment by quinine, iron, alcohol and nutritives. The so-called typhoid symptoms—increasing prostration and tremulousness, muttering delirium, dark tongue, sordes, subsultus, etc.—were invariably met by support and stimulants; but these were often employed long before the development of such dangerous symptoms. In many cases as soon as the pulse lost its fulness tincture of iron was prescribed in doses of twenty drops three times a day, with alcoholic stimulants, small doses of quinine and the use of beef-essence at short and stated intervals. This was continued to the end of the attack and in favorable cases well into the period of convalescence. Citrate of iron and quinine were employed in some cases. Quinine was generally given in one-grain doses three times a day. Whiskey, in the form of milk punch, was the stimulant in common use; but wine, wine-whey and brandy-punch were also largely employed. The quantity of stimulants varied with the necessities of the case as recognized by the prescribing physicians. Some medical officers dispensed them with a liberal hand. In case 2 of the *post-mortem* records, whiskey to the amount of six ounces was given daily, and this quantity was afterwards increased to sixteen ounces on account of prostration. Practically, in such cases, the patient took all that he could from time to time be prevailed upon to swallow. As a contrast to this, the patient in case 249 used only half an ounce of brandy three times a day. Suggestions of pulmonary and peritoneal inflammation probably kept the quantity at a minimum in this case; but in other instances stimulants were given freely irrespective of inflammatory complications. In some cases, when the patient

was unable to swallow, stimulants were given, as in 84 of the Seminary series, by enemata. The beneficial effects of this plan of treatment are not evidenced by the records, for certainly a larger quantity of alcohol was given to the average protracted, serious or fatal case than to the typical mild case ending in speedy recovery. Nor can the fatality of the disease as thus treated be compared favorably with the results of other treatment in civil practice before or since the war. But as this system of treatment aimed with all the power of the therapeutics of the period at obviating the pronounced tendency to death from exhaustion, it seems probable that had suitable comparisons been available a favorable exhibit would have been presented.

In a few cases chlorate of potash was used as a remedial agent when typhoid symptoms were present, as in 95 of the *post-mortem* records; in 111 of the same series it was given in a more active stage of the fever without producing any apparent beneficial effects. The following extracts relate to the use of this salt in the continued fevers:

Surgeon EZRA READ, *21st Ind., Fort Marshall, Baltimore, Md., Jan.* 14, 1862.—In the treatment of typhoid fever I have relied upon a liberal use of quinine and a supporting diet. Where the tongue became red and very dry I administered chlorate of potash in five-grain doses every three or four hours with great benefit. For several years I have used it in like cases, and can recommend it with much confidence. It diminishes the redness and restores the natural moisture more readily than any other remedy which I have used. For a like purpose I have not omitted the use of turpentine in ten-drop doses every three or four hours where it seemed indicated. Well-ventilated rooms, scrupulous attention to cleanliness and frequent sponging the body with tepid water, alone or mixed with vinegar or whiskey, are absolute essentials in the successful management of the disease.

Surgeon ROBERT HUBBARD, *17th Conn., Brook's Station, Va., March*, 1863.—The treatment of this disease by nutritious diet and stimulants, of which milk-punch has seemed to operate the best, and when the tongue and mouth are dry and sore the exhibition of quinine with turpentine emulsion or chlorate of potassa has been successful except in one instance associated with an intractable and exhausting diarrhœa. Nearly all the cases of fever have had diarrhœa as a prominent symptom; but it has usually yielded to stimulants and farinaceous diet, with condensed milk. Opiates and astringents have been used only when there was much sleeplessness and persisting diarrhœa.

Chlorate of potash was used as a local application in many cases in which the tongue, mouth or throat was abraded or ulcerated. It may be noted also, with reference to the condition of the tongue, that in 249 of the *post-mortem* records an effort was made to prevent an excessive dryness of its surface by the local use of glycerine.

Opium, which was used so frequently in the form of Dover's powder in the early stages to control fever and allay cerebral excitement, and at a later date with astringents to restain diarrhœa, was also largely used when an aggravation of the abdominal pain suggested a possibility of peritoneal inflammation. The frequent occurrence, in the course of the fever, of therapeutic indications which could be best fulfilled by means of this drug rendered it an important agent. In fact, it may be said of some hospitals that opium and brandy constituted the essentials of treatment. In cases 13 and 14 of the *post-mortem* series, from the Ladies' Home hospital, New York, the treatment is said to have been effected in the one case by laudanum, brandy, beef extract and milk, and in the other by anodynes, alcoholic stimulants and sustaining diet. Cases 19, 20, 82 and 226 of the same series may be noted as illustrations of the use of opium to alleviate the intense pain of peritoneal inflammation; in 50, the drug was given by enema on account of gastric irritability. The hypodermic syringe had not yet found its way into the hands of our officers.*

*It was not until after the close of the war that hypodermatic medication began to be discussed in our medical journals. RUPPANER's treatise on *Hypodermic Injections* was not published until 1865, although in 1859, in the *Boston Medical and Surgical Journal*, its author called the attention of the profession to the value of the syringe in the treatment of neuralgia. PANCOAST, in his *Manual of Hypodermic Medication*, Philadelphia, 1868, ascribes the new art to the discovery of the practicability and utility of introducing medicines under the skin for the relief of local pain, by ALEXANDER WOOD of Edinburgh in 1843, and the demonstration by Mr. CHARLES HUNTER of London in 1859 of the important fact that the application of the injection to the painful points, as contended for by Wood, was really unnecessary, as equally good effects followed the introduction of the injection into a distant part.

For the relief of abdominal pain local applications were frequently employed. Warm fomentations, poultices, cupping, turpentine stupes and blisters were used according to the urgency of the symptoms. In case 300 of the *post-mortem* records woolen packing of the abdomen was substituted for the poultice. A blister was applied to the abdomen in 85 of the Seminary series on account of pain along the track of the colon and the passage of blood from the bowels. Blisters were applied in 94, 96, 98 and 119 of the same series on account of excessive tenderness and tympanites; in 50 and 93 of the *post-mortem* records the resort to cantharides was occasioned by pain following perforation of the bowel. In the last-mentioned case gray spots appeared on the blistered surface, and three days later an erysipelatous redness extended downward to the thigh;* liquor sodæ chlorinatæ and a strong solution of nitrate of silver were applied, without benefit, as a dressing to the sloughing surface.

Blisters and other counter-irritants were also used on account of pain in the chest connected with pneumonic complications, as in 36, 38 and 41 of the Seminary series. In such cases the local applications were often associated with general medication, as by small doses of sulphate of magnesia and tartar emetic, calomel and opium, stimulants, expectorants, etc

Tympanites, which was frequently the cause of abdominal pain, was relieved in some instances, as in 88 and 118 of the Seminary series, by enema, and in one, 96, by the passage of a tube into the intestinal canal. Occasionally, also, the removal of retained urine was followed by relief to abdominal pain; the catheter is reported to have been used in 121 of the Seminary series, and in 6, 83 and 268 of the *post-mortem* records; retention was sometimes treated by extract of buchu, as in 28, 110 and 119 of the former and 65 of the latter series of cases.

Hemorrhage from the bowels appears to have called for the use of persulphate of iron in 109 and 335 of the *post-mortem* series.

Aromatic sulphuric acid was generally employed to control the exhausting perspirations which recurred nightly in many cases at a late period of the disease, although in 18, 19 and 112 of the Seminary series it does not appear to have been very successful in checking them; in the first-mentioned of these the surface was sponged with alcohol and diluted nitro-muriatic acid, and in 83 with alcohol alone, as a means of lessening the perspiratory action.

When collapse was imminent warmth, frictions and rubefacients were applied externally, while capsicum, ammonia and brandy were freely prescribed.

Bedsores were prevented and treated by cleanliness, change of position, special padding and sponging with alcohol. In 113 of the Seminary series a water-bed was used. KEEN speaks of the valuable results produced on bedsores by applying ice for fifteen minutes and following this with a hot flaxseed poultice for two or three hours.† One of the few reports relating to the treatment of typhoid fever on file in this office urges the advantages to be derived from change of position during the course of the fever.

Surgeon CHARLES ABBOTT, *26th Me., Baton Rouge, La., January*, 1863.—**Typhoid fever appears to be endemic, and in its treatment we find it necessary to use stimulants freely and easily digested animal food; also to change frequently the position of the patient. This last point we consider of great importance, being satisfied that the loss of one of our cases was wholly the result of persistence in lying on the right side, thus producing passive congestion of the lung.**

During the war Mr. HUNTER was engaged in extending the use of the hypodermic method from Edinburgh and Dublin, where it was first employed. It was tried and reported upon favorably by COURTY of Montpellier, BÉHEIR of Paris, SCANZONI of Wurtzburg, OPPOLZER of Vienna, GRÆFE of Berlin and many others who established its use in Europe; and very shortly afterwards the hypodermic syringe became naturalized in this country.

*Dr. JAS. L. CABELL reported two fatal cases of sloughing from the same cause in the Confederate hospital at Charlottesville, Va.—*Richmond Med. Journ.*, Vol. I, 1866, p. 453.

†See his pamphlet, cited *supra*, page 297, where he says, page 32: "The treatment, first proposed, I believe, by BROWN-SÉQUARD, of ice poultices for fifteen minutes, followed by hot flaxseed poultices for two or three hours, often stimulates the most indolent bedsores to heal with surprising rapidity. During and since the war I have repeatedly and successfully tried this plan of treatment."

A communication filed by Surgeon A. L. Cox, U. S. V., advocates the use of arsenious acid in typhoid fever. He claims value for it as exercising a specific influence on the intestinal glands, preventing their ulceration when administered in the early stages, and promoting granulation and cicatrization when given at a later period. Fowler's solution was inadmissible on account of the gastric disturbance which it excited, but the solid acid, taken after a small quantity of prepared arrowroot, rice, custard or other suitable food, acted with an almost magical curative power. One-tenth of a grain was administered three times a day combined in the form of pill with an equal quantity of opium. It is claimed that two days of this treatment induced a marked improvement in the symptoms, five days sufficed to suppress the febrile action and ten days effected a thorough cure. Two cases given as illustrations of its use are briefly as follows:

1.—Captain Palmer, 26th N. Y., was attacked at Sharpsburg, soon after the battle of Antietam, with loss of spirits and appetite, slight headache and a disposition to avoid all exertion. At the end of ten days, when Surgeon Cox was called in consultation by W. B. Coventry, the regimental surgeon, the patient had duskiness of countenance, epistaxis, right iliac tenderness, some tympanites, temporal headache, pungent heat of skin and accelerated pulse, 110, which led to a diagnosis of typhoid fever. Pills of arsenious acid and opium were administered, and an application was lodged for leave of absence that the benefit of home treatment might be obtained. Ten days elapsed before the leave of absence was obtained, but by this time the fever had been subdued and the patient was so well that the propriety of accepting the leave seemed doubtful.

2.—A teamster attached to brigade headquarters was taken seriously sick on a certain Friday. Within a day or two he became irrational, continually attempting to get up; and in one of these efforts he had fallen from his wagon to the ground, where he was found at night helpless and unconscious. Dr. Chapelle, medical officer of the battery on duty with the brigade, saw him on Sunday and learned that some of his comrades, recognizing typhoid symptoms, had given him whiskey and quinine. The quantity was not known but was supposed to have been large, as on Monday, when seen by Dr. Cox, the patient had symptoms which were recognized as indicative of meningitis. His pulse, 110, was hard and strong, his countenance flushed and eyes bloodshot, but the delirium was low and muttering. He could be roused from his almost comatose condition by speaking in a sharp tone, and he made ineffectual efforts to protrude his tongue when directed to do so. The tongue had a white streak in its centre, its edges were scarlet; sordes appeared on the lips and teeth; the abdomen was hard, tympanitic and tender, and there was a tendency to diarrhœa. The patient was considered to be suffering from the effects of injudicious stimulation. Ten grains of calomel were administered. Next day the violent symptoms had subsided; the pulse had lost its hardness, the eyes their preternatural redness; the face had assumed its natural color, fair and fresh as that of a well-nourished Englishman; but the semi-comatose condition persisted, with inability to protrude the tongue or speak coherently; the abdominal symptoms and the frequency of the pulse also continued. Pills of arsenious acid and opium were prescribed for administration three times a day; nothing else was given but water as a drink and small quantities of farinaceous food. On Wednesday the patient answered questions intelligently. On Thursday he was greatly improved. His condition on Friday is not stated. On Saturday he was despatched to Washington as a convalescent. On the afternoon of that day Dr. Cox saw him at the railway station, Warrenton, Va., and loosening his clothing, made an examination of the abdomen, on which some roseate spots were to be seen. Dr. Moseley, Surgeon-in-Chief of the division, passed at the moment, and noting these said—"That is perfectly conclusive as to the nature of the case." The record closes with an account of an accidental meeting between Dr. Cox and "a stalwart pedestrian crushing under him the brush and briers which were in his way,—a man of brilliant countenance and fine proportions with every expression of health and strength," who proved to be the recently sick teamster. This meeting took place on the eighteenth day after the patient had been obliged to give up his duties on account of sickness.

Surgeon Cox's favorable experience of the use of arsenious acid in typhoid fever does not appear to have led other medical officers to report similar results, although the field hospitals at all times afforded facilities for testing a question of this nature.*

Acting Assistant Surgeon B. Brandies thus describes the treatment adopted by him in the wards of Hospital No. 1, Nashville, Tennessee:

* L. Ditterich, *Blätter für Heilwissenschaft*, Munich, Jan. 31, 1871, in recording the results of an experience of twenty-six years in the arsenical treatment of typhoid fever says, that after the use of the remedy for two or three days moisture returns to the dry and cracked lips and tongue and the dark coating of the latter disappears; hemorrhage, from whatever source it may proceed, becomes less and in five or six days ceases entirely; at the same time delirium and subsultus subside, petechiæ fade, the small tremulous pulse improves in character, the eyes become brighter and the countenance regains its natural expression. Diarrhœa, meteorism and splenic swelling subside more slowly and disappear only in the period of convalescence. Bedsores seldom form; and the disease runs a shorter and milder course. Arsenic is of no advantage, and indeed may do harm so long as there is only a catarrhal state of the mucous membranes, whether of the respiratory passages or alimentary tract; but when nervous disorder becomes decided and the secretions dry up, the tongue becoming dark and cracked and the abdomen tympanitic, the remedy proves of value. It is given in the form of Fowler's solution of which five drops only are used in the first twenty-four hours; on the second day ten drops are administered. The patient can seldom take fifteen drops without distressing the stomach.

I constantly abstain from three things—mercury, purgative medicines generally and emetics. My treatment may be divided into that of the disease itself and that of its complications. Assuming that the disease is dependent on a poisoned condition of the blood, I direct medication against that condition by administering chlorine or muriatic acid. I regard these as equally powerful. The former is contraindicated by cough and extensive bronchial catarrh; the latter by diarrhœal tendencies. I pay particular attention to purity of air and cleanliness of the person and bedclothes, frequently sponging the surface with aromatic vinegar and water. A light, nourishing diet is enjoined, as of beef soups, milk, good strong coffee, and as a drink water or lemonade. I meet *headache* with applications of cold water; *active delirium* with hyoscyamus and camphor; and *opisthotonos*, which I regard as a localization of typhoid material on the medulla or its membranes, with cupping on the nape of the neck and camphor or musk. *Swelling of the parotid gland* is treated by the application of a camphorated iodine ointment with flannel, and when suppuration is manifest poultices and the lancet. Senega or squill with carbonate of ammonia, or camphor with opium or hyoscyamus, relieves *bronchitic complications*. *Pulmonary congestion* is treated by frequent changes of position, quinine, brandy and muriate of ammonia. For *nausea or vomiting* neutral mixture is prescribed, with blisters over the stomach; aqua lauro-cerasi or acetic ether, in five- or ten-drop doses on sugar every hour, is sometimes beneficial. I have often permitted *constipation* to go on for five or six days with great benefit to the patient. Instead of purgatives I use an enema of turpentine and olive oil, or of equal parts of vinegar and water; the latter acts promptly. In *diarrhœa* I do not interfere, if there are not more than four or five characteristic typhoid dejections in the twenty-four hours, but if the stools be in excess of this I endeavor to control them with alum and opium in gum arabic mixture; when they are sanguinolent, the same prescription or diluted sulphuric acid, sometimes with alum or sulphate of iron, is successfully used; when they assume a chocolate color and very offensive odor, I prescribe charcoal with aromatic powder. The latter remedy is also useful in *tympanites*. Indications of *peritonitis* or *perforation* are met with large and repeated doses of opium and the application of ice-water to the abdomen. *Retention of urine* is treated by systematic catheterization, a practice which is needful in all cases of *coma*, as well to prevent involuntary defilement of the bed as to relieve distention. One case which presented a *paralysis* of the bladder, even after convalescence, was treated successfully with ergot in five-grain doses every four hours; in another, complicated during convalescence with *catarrh of the bladder*, injection of a solution of nitrate of silver removed the trouble. *Bedsores* were prevented by frequently changing the position of the patient, by the use of clean sheets, and particularly by India-rubber water cushions; an ointment of lead, tannin and camphor or the charcoal poultice was used when sloughing had already commenced.

The only other paper relating to the treatment of typhoid fever on file in this office is a communication recently received from Dr. GEORGE M. RAMSAY, formerly Surgeon 95th N. Y. The following abstract and quotation are submitted:

Typhoid fever is emphatically a low and slowly progressive fever. Its diagnostic symptoms are low fever and restlessness, furred tongue, slight constipation and scanty urine. In its treatment we must abate the fever, calm the nervous system and restore the secretions and excretions to their normal condition. Scanty urine and constipation are always associated with fever. They result from it and require treatment. The diarrhœa that follows is a reaction of the system—an effort of nature at recovery. To allay the fever give one grain of quinine in half a drachm of sweet spirit of nitre three or four times in twenty-four hours. To restore the secretions and excretions use the following pill, one or more, or less than one daily, so as to obtain one movement of the bowels every twenty-four hours: A half-grain each of iodide of mercury, ipecacuanha and extract of hyoscyamus, and one grain each of camphor and compound extract of colocynth, with syrup as an excipient. The fever will abate, the tongue clean off and the appetite return within forty-eight hours after this treatment has been commenced. Dry toast and tea with milk may be given as nourishment.

"I adopted this method of treatment at Belle Plain, Va., in 1862–63, but before I had become fully satisfied of its potency I permitted a patient to sink into the typhoid condition: Pulse 100; tongue dry as a chip, much swollen, black-brown in the centre, concave on its dorsum and curled up at the edges. I gave him a dose of the solution of quinine in nitrous spirit and repeated it in fifteen minutes. In ten minutes more I gave him a third dose, and in five minutes after this last dose the tongue had become moist and rounded. Then I ordered tea and toast, of which he ate sparingly. Under the continued use of the quinine and nitre-drops three or four times daily, and the pill as described, this patient steadily improved and was returned to duty in ten days. Several cases of typhoid fever were treated in shelter-tents at Sharpsburg, Md., during very inclement rainy and cold weather. Under the treatment as specified the cases terminated favorably in ten days. Again, in the winter of 1863, a most aggravated case was treated in the regimental hospital. The command had marched to Raccoon ford, ten or twelve miles distant, and returned to its old camp next day, where I found that this fever case had been without shelter from the rain and cold for twenty-four hours, the quartermaster having taken down and carried away the hospital tent. As a result the patient had become much worse; he muttered and was incoherent; pulse 100 and weak. It was feared that he was beyond recovery; but, under the treatment described, his tongue became moist and clean in forty-eight hours, and convalescence progressed rapidly. After twenty years of civil practice I continue to place implicit reliance on this mode of treatment."

Great stress was laid on the alkalinity of the urine as a therapeutic indication by Surgeon GEORGE D. WINCH, 12d Wis., who directed special treatment to this condition.* He reported that of thirty-three cases treated at Cairo, Ill., only one terminated fatally. In most of these

* *Chicago Medical Journal*, Vol. XXII, 1865, p. 15.

an alkaline state of the urine was present throughout the attack unless corrected by acids. In cases of relapse this alkalinity persisted after convalescence from the primary attack, even after return to duty, and was found when the patient was readmitted to hospital. The gravity and duration of the case were in direct proportion to the intensity of the alkaline condition. In mild cases Surgeon WINCH gave fifteen drops of diluted hydrochloric acid three times a day, beef-tea every three or four hours, small doses of some alcoholic stimulant, opium if necessary to quiet wakefulness, and stimulating expectorants for pulmonary affections. In cases of a more aggravated character tincture of opium was used in conjunction with the acid, and one or two grains of quinine were given four or five times a day, or, when there was much anæmia, tincture of iron with compound tincture of gentian.

The diet of the continued fever cases of the war was usually precisely indicated. Our medical officers recognized the necessity for a constant reparative supply in a prolonged disease characterized by rapid waste and progressive asthenia; but at the same time they exercised a judicious care in the management of the dietary in view of the implication of the alimentary canal in the diseased action produced by the fever-poison. Liquid preparations and concentrations were employed during the progress of the attack, and in many instances the return to a normal dietary was not permitted until convalescence was well advanced. Patients treated in the regimental hospitals of stationary camps, as during the occupation of winter quarters, were usually well cared for in this respect. They were under the observation of their own medical and company officers, personal friends and perhaps relatives in the ranks, who made special efforts to procure for them whatever was recommended outside of the limited resources of the hospital. In the field division hospitals, which were practically a consolidation of the regimental establishments, large hospital funds enabled the surgeon in charge to purvey through his subsistence officer occasional supplies of milk, eggs and chickens, and a constant supply of fresh meat for the preparation of animal broths. These, with the beef-extract, condensed milk and farinas of the regulation supply list, furnished materials for a dietary the real value of which depended on the competence of the culinary knowledge which superintended its preparation. The general hospitals in northern cities, with large funds and open markets, found no difficulty in perfecting the dietetic arrangements of their special diet kitchens. As a rule, but few cases of fever suffered at any time from the want of appropriate food. These exceptional cases were taken sick while their commands were in active service, when the fatigues and privations of the march, the arrangements for anticipated battle, and the primary disposition of large numbers of wounded men often prevented that assiduous attention to their wants which would have been accorded them in the general hospitals or in quieter times at the front.

CHAPTER V.—ON THE DISEASES ALLIED TO OR ASSOCIATED WITH THE PAROXYSMAL AND CONTINUED FEVERS.

The fevers which prevailed in our camps were readily divisible into two groups, the paroxysmal and continued. Each of these was as readily susceptible of subdivision into groups of lesser magnitude, the one into intermittent, congestive, remittent and sub-continued malarial fevers with adynamic tendencies; the other into common continued, typhoid, typho-

malarial and typhus fevers. Large numbers of what may be regarded as typical cases of each of these were no doubt observed, but it must be acknowledged, from the records that have been presented, that clinically there were no definite boundaries to the groups. Each was overlapped by the other. Even the two grand groups had a common territory where the malarial fevers became continued. Looking at the paroxysmal cases as a whole, there may be said to have been no break or missing link between the well-defined simple intermittent on the one hand, and the pernicious congestive case or the sub-continued malarial fever with its typhoid tendencies on the other. Looking at the continued fevers as a whole, there may be said to have been no break between the ephemeral fever simulating a single paroxysm of the intermittent, the prolonged typhoid case with intestinal, pulmonary or cerebral developments, and the more rapidly fatal cases that were clinically undistinguishable from those usually ascribed to the powerful operation of the cause of typhus, cerebro-spinal fever or pneumonic consolidation. Moreover, the two grand groups were interlocked as well in their pernicious phases as in their protracted course; for while in the former they bore a strong general resemblance to each other, in the latter they were attended with intestinal, lung and brain symptoms that connected them clinically with each other and with diarrhœa and dysentery, pneumonia and cerebro-spinal meningitis.

Having considered the mutual relations of malarial and typhoid fevers, it seems advisable now to refer to the relations that existed between these fevers and those diseases that seemed so closely allied to them as to be in some instances undistinguishable from them clinically, and in others to arise as a direct result of hyperæmic conditions determined by their morbific causes.

I.—CEREBRO-SPINAL FEVER.

I.—CLINICAL AND POST-MORTEM RECORDS.

The number of cases of cerebro-spinal fever that occurred among the troops is not known. The official reports of sick and wounded did not provide a specific heading for the segregation of cases of this disease; hence no statistics can be submitted bearing on the absolute or relative sickness and mortality caused by it. A few of the cases were perhaps reported as inflammation of the membranes of the brain; the proportion of deaths reported from this cause in every thousand men—viz., .36 in the first year of the war, when cerebro-spinal fever was unobserved—was slightly greater than the corresponding ratios of the subsequent years, .32, .33, .28 and .19 respectively, when this fever assumed some degree of prominence. Probably some of the cases were returned among the non-specified diseases of the miasmatic order, as the percentage of fatality of these rose considerably after the first year. Most of the cases, however, appear to have been entered on the reports as congestive, typhus, typhoid or typho-malarial fever.

The case-books of the general hospitals testify to the occasional occurrence of the disease, and even to its epidemic prevalence in certain commands; but from these records no estimate can be formed of the number of cases that occurred in the field. The suddenness of the attack and the rapidly fatal issue usually prevented those struck down in camp from reaching the hospitals. It is certain, however, that at no time were the cases numerous:

When prevailing as an epidemic in the camps around New Berne, N. C., only a few men became affected in each regiment.

One hundred and five cases are presented below. None of these occurred during the year ending June 30, 1862, when typhoid fever was at the height of its prevalence; nevertheless there is every reason to believe that the disease was present, although, on account of the absence of a proper designation for it in the reports, but little record of its existence has been left. The following extract from a letter* of Surgeon R. B. Bontecou, U. S. Vols., shows that it occurred as early as January, 1862, in the hospital at Fort Monroe, Va.:

Seven cases of a very interesting character, namely, cerebro-spinal meningitis, were treated, but all died, with the exception of one, soon after admission. This one lingered for some weeks, and finally sank from sudden increase of effusion in the ventricles. All these were examined after death, and extensive deposits of lymph or pus were found in the cavity of the spinal arachnoid and over the cerebral convolutions, and in the ventricles of the cerebrum and cerebellum, on the visceral and peripheral surfaces of the pericardium and in all the joints, but without inflammatory indications in the peritoneum or tunica vaginalis testis. In one the lateral ventricles were greatly enlarged and distended with sero-purulent fluid, but the other cases presented no unusual enlargement of these cavities.

During the same winter the disease appears to have been observed in the 44th N. Y., encamped at Hall's Hill, Va., near Washington, D. C. Medical Inspector Vollum, U. S. Army, reported of this regiment as follows:

There has been considerable typhoid fever and five cases of typhoid-pneumonia; four cases of cerebro-spinal meningitis have also occurred. These proved fatal in from six hours to four days, the patients in three instances becoming delirious and remaining so until death. An autopsy in two of the cases showed large effusion on the brain and spinal cord.

Some details of these cases have been made public by the Regimental Surgeon, W. Frothingham.† Measles, typhoid and malarial fevers were prevailing in this command at the time of the outbreak of cerebro-spinal fever.

The winter was mild and damp. The soldier's quarters were about seven feet square, the walls two or three feet high, built of logs plastered with mud and roofed in by a tent-cover. Each [illegible] occupied by six or seven men. No attention was paid to ventilation at night, notwithstanding the efforts of the medical officers in this behalf. There had been during the winter some two or three hundred cases of measles in the regiment, and intermittent, remittent and typhoid fevers prevailed. Four cases, all in young and robust men, were reported; in none of them were any petechiæ present to constitute spotted fever.

1.—The patient complained in the night of severe pain in the head, and at daylight was found with his hands pressed upon his abdomen, groaning and insensible. One arm and leg were paralysed, and there were occasional convulsive movements of the rest of the body except the face. The pupils were insensible and somewhat dilated, the conjunctivæ dull-red, the face darkly flushed, the tongue and teeth coated with sordes, the pulse frequent and feeble and the breathing stertorous. He died in the afternoon. The treatment [illegible] temples and back of the neck and croton oil internally.

2.—The patient was attacked one morning with a chill followed by fever and severe headache. In the afternoon he felt better [illegible] and the fever seemed to be nothing unusual [illegible] and the patient was quiet during the night; but next morning he was attacked with tonic and clonic spasms. The face was pale and free from convulsive movements; the eyes suffused and dull, the pupils insensible and somewhat dilated. Consciousness was lost and the evacuations were passed involuntarily. He died at noon. Chloroform, given to control the spasm, and mustard along the spine, constituted the treatment. *Post-mortem* examination revealed some congestion of the dura mater, and a layer of exudation beneath the arachnoid, slight over the cerebellum and anterior lobes of the cerebrum but more abundant over the posterior lobes of the latter, the base of the brain and the medulla oblongata. The spinal cord was not examined. The [illegible] highly congested and contained [illegible] in the tissues of [illegible] serum. All the viscera were normal.

3.—The patient complained of pain in the head and chilliness followed by fever. Next day pain in the head and neck was intense; the pulse was rapid and feeble. Cups and counter-irritants were applied. Meanwhile the pain increased, and towards the evening he seemed [illegible] from which he could with difficulty be roused. He died comatose on the third day. No convulsions were observed in this case. At the autopsy of a similar case in a regiment near by, the brain lesions were similar in character to those of case 2, but the effusion was of a greenish-yellow color and not so abundant. The spinal cord was abundantly coated with a greenish, semi-fluid, [illegible] exudation. This patient had been sick longer, but died after three or four days illness.

*Published in the Medical and Surgical Reports, Vol. [illegible], p. [illegible]

†American Medical Times, Vol. VIII, 1864, p. 207.

4.—The patient had chills, a rapid but feeble pulse, dull and injected eyes, furred tongue and constipation. He suffered from excruciating pain in the back of the head. Some relief was obtained by the application of leeches to the temples and neck—a remedy renewed four or five times during the day. The symptoms gradually disappeared leaving only great debility, from which he recovered.

E. Y. YAGER of Chillicothe, Mo., states that four cases were witnessed by him in April, 1862, in the 3d Mo. Cav.,* then stationed in the town mentioned. An extensive epidemic of measles was prevailing at the time.

The symptoms were chills, severe headache, high fever, soreness and pain in the muscles of the neck and jaws and tenderness along the spine, delirium and retraction of the head. Two of the cases recovered and two terminated fatally in less than sixty hours. In one of the latter several paroxysms of convulsions came on within a few hours after the attack. The survivors, a few days after the commencement of the complaint, fell into a typhoid condition from which they did not recover for weeks. Recovery in one case was perfect.

The epidemic which produced these and other cases at Chillicothe and its vicinity made its appearance in February and continued until May. It prevailed to some extent among the population at large, but particularly among those civilians who, as political offenders, were confined in the guard-house. Among these no case of recovery was noted; as many as five deaths a month occurred among a number of men never greater than twelve or fifteen.

Dr. YAGER also reports that in February five cases appeared in the 23d Mo., also stationed at Chillicothe. He did not see these, but was informed that three ended fatally by coma in less than forty-eight hours and two recovered after a protracted convalescence. These men, on the night preceding their attack, had been exposed while on guard to a snow-storm which had been ushered in by a dense fog and chilly east wind.

The disease was terribly fatal. In many localized epidemics no patient was known to have recovered. Of the one hundred and five cases recorded below only seven evaded the fatal issue; but this statement exaggerates the deadly nature of the disease, for in some of the hospitals only those cases that came to the *post-mortem* tables were recorded. At New Berne, N. C., four of twenty-seven patients whose cases are recorded survived the attack; but fifty-two cases were believed to have been under treatment, and of this number thirty-six died and sixteen recovered.

The New Berne epidemic occurred during January and February, 1863. The regiments that suffered most were the 44th, 45th and 51st Mass. nine-months men, who had seen but little service. They were quartered on the banks of the Neuse and Trent in huts built of green lumber. The barrack of each company was fitted with bunks, in three tiers, for one hundred men, and gave 180 feet of air-space per bunk; but as the companies did not average more than sixty men the air-space per man at the time of the outbreak was about 300 cubic feet. Ventilation was effected by shafts through the ridge and apertures near the floor between the bunks. The site was a sandy and sterile plain, broken occasionally by stagnant pools and marshy spots; it was elevated only a few feet above the level of the water of the rivers. Beyond this plain the country was covered with pine forests, swamps and tangled undergrowth.

The regimental records do not show how many cases occurred, as the disease can be identified on the monthly reports of sick and wounded of but one medical officer, Surgeon SAMUEL KNEELAND, 45th Mass. In January this officer reported 1 case of typhoid fever and 5 of malarial cerebral disease. In February his command was free from miasmatic diseases, which he attributed to a change of station, the regiment having been removed to New Berne for guard duty. Surgeon GEORGE JEWETT, 51st Mass., reported in January 21 cases of typhoid, 7 of typho-malarial, 12 of remittent fever and 1 of inflammation of the membranes of the brain, with two deaths, 1 from congestive chill and 1 from typho-malarial fever. In February he reported 17 cases of typhoid, 9 of typho-malarial fever and 13 remittents, but no other cases which might be conceived to represent the disease then con-

* *Chicago Med. Examiner*, Vol. V, 1864, p. 396.

sidered epidemic in his camp; the only death returned during this month was said to have been caused by typho-malarial fever. In March the report shows 1 case of typhoid, 12 of remittent fever and 1 of inflammation of the membranes of the brain; no death occurred,—the regiment meanwhile had changed camp to Beaufort, N. C. Surgeon R. WARE, 44th Mass., reported in January 2 cases of typhoid and 19 of typho-malarial fever, 3 of the latter having proved fatal. In February no case of typhoid, typho-malarial or congestive fever was reported, nor in fact of any disease which might be supposed to represent on paper the cases received into the New Berne hospitals. Nevertheless Ass't Surgeon THEO. W. FISHER, who was in charge of the regiment when the report for March was furnished, remarked on the report that the epidemic of cerebro-spinal meningitis which prevailed in the command in January and February was now abating as only one case had occurred during the month, and yet the body of his report shows no case that could be regarded as the one in question, if those entered under the headings typhoid and typho-malarial fevers are excluded from consideration. Manifestly the cerebro-spinal cases of the Stanley and Academy hospitals were the typhoid and typho-malarial fevers of the regimental reports, and in view of the small number of deaths in the regimental camps those hospitals may be supposed to have received most of the cases.

Dr. UPHAM in his *Hospital Notes and Memoranda** refers to a clear and able report of the disease, for which he was indebted to Surgeon GEORGE JEWETT, 51st Mass. He quotes from this report and states that of the fourteen cases communicated by that officer all were fatal. The inference from this, that fourteen men perished in the regimental camp of the 51st Mass., in addition to those that died in the New Berne hospitals, is inconsistent with the facts. Surgeon JEWETT joined the regiment in December, 1862, during which month no fatal case of disease occurred in his camp, and the substance of his reports of sickness for the epidemic months, so far as relates to the subject in question, has already been submitted. The following probably formed the basis of the report to Dr. UPHAM:

Surgeon GEORGE JEWETT, *51st Mass., New Berne, N. C., Feb.* 14, 1863.—In January, a fearful epidemic broke out in our regiment which was at first supposed to be congestive or typho-malarial fever. After several deaths had occurred an autopsy revealed the true character of the disease, which proved to be cerebro-spinal meningitis.

The first case occurred on the 10th. A drummer boy was taken with nausea, vomiting and general febrile symptoms; pain in the head and back; face and eyes suffused, pupils dilated; skin moist and warm; retention of urine; tongue slightly covered with a thin white coat; pulse rapid and at first feeble. These symptoms soon became aggravated; the pulse increased in force and frequency; great restlessness came on with jactitation and delirium; a copious viscid secretion filled the throat and nares. The patient died by apnœa in thirty-six hours. No autopsy was held.

From January 11 to this date fifteen deaths have occurred in the regiment, all but one from inflammation of the brain and spinal cord. The single exception was a case of typhoid fever with prominent cerebral symptoms.

There has been a remarkable uniformity of notable symptoms. The disease attacked the young, active and vigorous and those of apparently the greatest vital power. The eldest was thirty years of age, the youngest sixteen; the average age twenty years. The greatest duration of the disease was twenty-three days—the least one day. It generally came on much like malarial fever, with pain in the head and back and fugitive pains in various parts of the body. Often it was ushered in by a rigor followed by nausea and vomiting. In a few, and these the most severe cases, no moan or sound of any kind escaped the patients; but there was manifested a fearful restlessness, which ceased only with death. In others there was much moaning; in a single case pleasing delirium was noticed with much loquacity. Erotic desires were observed in about one-third of the cases. In about a third, also, there was more or less stiffness of the muscles of the back and neck, with opisthotonos; in one there was paralysis of the glosso-pharyngeal nerve. The skin was uniformly moist; the tongue generally moist, but in a few instances the disease assumed a typhoid character, with the tongue dry and brown. The face was often suffused and the conjunctivæ congested. In two or three cases there was occasionally squinting. In all the violent cases the urine was retained. The bowels were often loose and the discharges offensive, but constipation was occasionally present. Decubitus was dorsal in but a single case: in the others the patient lay upon the side until the close of life. No petechial spots were noticed in any of the fourteen cases, although such were frequently observed in cases occurring in other regiments. The pathognomonic symptom was a violent pain in the back of the head.

* *Boston Med. and Surg. Jour.*, Vol. XLVIII, p. 316.

Post-mortem observations were made in five cases. Of these I select two for illustration; one terminated in twenty-four hours, the other was protracted for twenty-three days: In the first the arachnoid and pia mater were firmly adherent, particularly on the right side; the subarachnoid space was filled with straw-colored serum. There was more fluid in the right ventricle than in the left; the surface of the brain was highly congested, and small patches of lymph were found at the base of the cerebellum. The cerebro-spinal fluid was greatly increased in quantity, of a milky appearance and yellowish color; the membranes were congested and the cord softened. In the second the lateral ventricles were filled with straw-colored fluid, the vessels of the choroid plexus strongly injected, and the fourth ventricle filled with serum and pus; deposits of lymph, three lines in thickness, were observed about the pons Varolii and inferior surface of the medulla oblongata. The membranes of the cord were much congested; one and a half ounces of sero-purulent matter drained from the spinal canal; the cord was enveloped in a layer of lymph from two to three lines in thickness; its substance was softened in the lower dorsal region and the cauda equina and sacral nerves were coated with lymph. In all the cases which I have thus far examined the organs of the thorax and abdomen were in a normal condition but for an increase of fluid in the pericardium in one instance to the amount of two and a half ounces.

The causes of this peculiar form of disease are various—and, firstly, as a predisposing cause climatic influences; secondly and mainly, the condition and character of the barracks. These had been recently constructed of green, hard pine boards, and the logs having lain long in water were saturated with sap and moisture. When first occupied they were almost without windows and poorly ventilated. The air-space per man was about 180 cubic feet. One important fact bearing on this point is that a large proportion of those that died occupied the highest tier of bunks; eight cases were taken from this row; three occurred among the men in each of the other rows. The facilities for warming are slight. There is a fire-place and chimney in each room, but so badly constructed as to prevent the radiation of heat; hence the barracks are cold, dark, damp and poorly ventilated. The food of the men has been of good quality and well prepared.

As to treatment little can be said. In the first cases the attack was supposed to be of a malarial character, and quinine and stimulants were given in large quantities; but after recognizing the true character of the disease cups, both wet and dry, were applied along the spine, with blisters to the nape of the neck and along the spinal column, while internally mercurials with opium were freely given and four grains of iodide of potassium every three hours. But a single case has recovered under my treatment after the disease had become fully established. In this mercurial ointment was rubbed along the spine twice daily, while tincture of iron in twenty-drop doses was given every three hours, with opiates as required; the patient remained in a low condition for some days and convalescence was tardy.

A number of men, apparently in the incipient stage, were successfully treated by large doses of opium repeated until convalescence was fully established.

The following is the account given February, 1863, by Surgeon R. WARE, 44th Mass.:

The regiment was recruited at Boston and mustered Sept. 12, 1862, numbering nine hundred and seventy-one men. It embarked October 22 on the transport Merrimac for New Berne, N. C. On this steamer was also placed one battalion of the 3d Mass. Over fifteen hundred men were thus crowded into the vessel. The space between decks was dark and ill ventilated; if inclement weather had compelled the men to remain below serious injury to their health would have resulted; but fine weather enabled us, by keeping the main deck always crowded, to give all the men in turn the benefit of light and fresh air. The accommodations for cooking were very limited in view of the number of men to be fed; there were no facilities for washing, and the privies were miserably inadequate.

The regiment disembarked at Morehead City October 26, and reached New Berne by rail the same day. Next day they occupied their present camp-ground, two companies housed in barracks which had just been closed in and the others in Sibley tents. But on the 30th the regiment, in light marching order, went on board transports for Washington, N. C., which was reached next day. During the following week an expeditionary march of 125 miles was made, in part through rain and snow. The command returned from Plymouth to New Berne November 15, and occupied the barracks which had been completed during its absence. These are situated on the Neuse, about half a mile from the town, and just beyond a small swampy stream which empties into the river. They are so near the edge of this swamp that the space allotted for the sinks, refuse pools, etc., is much too small for a permanent camp and too near the barracks. The quarters are built of green pine, the sills laid directly upon the ground. Each is 58×24×8½ feet to the top of the plate. They are very inadequately lighted and are warmed both by open fire-places and by stoves. On December 11 the regiment, equipped with blankets and overcoats, started on an expedition towards Goldsborough, and returned to New Berne on the 20th, having in ten days marched one hundred and fifty miles, bivouacking at night. It participated in the actions at Kingston, Whitehall and Goldsborough bridge. The weather during this march was clear with hot days and frosty nights. On the first day three men were sunstruck. Every day a number of men fell out of the column because of sore feet, but rejoined at night. The command embarked February 1 for Plymouth, where it remained seven days. It returned to New Berne on the 10th, having been two days on the transport. Since then it has remained in camp.

Camp-fever in the form of cerebro-spinal meningitis has been the most serious epidemic. This, and measles, from which the regiment is at present suffering, have been the only fatal diseases; catarrhal bronchitis, diarrhœa and tonsillitis have been prevalent at various times but have never assumed a serious form; six cases of pneumonia occurred, none of which were fatal. Cerebro-spinal meningitis first appeared Dec. 25, and up to the present date nineteen cases have been developed, twelve of which have ended fatally. No fresh cases have occurred since January 19, when the first heavy rains fell. A long spell of dry weather preceded the outbreak of the disease. The first symptoms in most of the cases were those of sudden and intense cerebral congestion; but in some the indications of

serious inflammatory disease of the brain came on gradually, and were occasionally preceded by symptoms of ordinary catarrh. One case was ushered in by violent convulsions, which were followed by coma lasting nearly ten days; another, which proved fatal in twelve hours, was characterized by sudden collapse, the patient becoming cold and pulseless, though retaining his senses till death, which was preceded by a copious petechial eruption. Petechial blotches were present in nearly all the cases, generally appearing during the first twenty-four or thirty-six hours. The disease may be divided into three stages or periods: The first, that of attack, is characterized by intense headache, stupor, a small quick pulse, duskiness of countenance and a condition approaching collapse—one man died in this stage. This is followed by reaction with noisy, almost maniacal delirium, deafness, squinting, slight opisthotonos and sleeplessness, ending in coma; most of the deaths have occurred in this stage. The third seems to be a typhoidal state, which gradually replaces the more acute symptoms of the second stage. *Post-mortem* examination has shown in most cases a deposit of lymph and pus upon the membranes of the brain and spinal cord; in some instances there was intense pericarditis; one case was complicated with iritis and another with effusion into the synovial capsules of the knee and elbow.* There is no evidence that the disease as it appeared here was contagious.

Until within the past two weeks fresh vegetables have been issued three times a week. Potatoes are now purchased out of the company fund. The average meat issue has been one day's ration of pork, four of salt beef and five of fresh beef in each ten days.

Several facts connected with the history of camp-fever in this department lead me to the opinion that the disease is not due to malaria alone, nor is it purely typhus in its origin. It arises, perhaps, from the combined action of these two causes; but the cases occurring in any one regiment are too few to warrant a definite opinion.

A few cases reached the hospitals in New Berne from some of the other regiments in the vicinity, and as these were camped under canvas, the green lumber used in the construction of barracks was relieved from the imputation of having caused the disease. Indeed, in view of this and of the fact that the 45th Mass. escaped attack in February by its detail to duty in the city, while the 51st, and perhaps the 44th, continued to suffer, the locality rather than the quarters should be indicted. Surgeon E. P. MORONG, 2d Md., in charge of the Foster hospital, New Berne, reported, April 1, 1863, as follows:

The disease made its appearance about January 1; it approached an epidemic form in the 44th and 51st Mass., but was sporadic in character in the department at large. I have seen no new cases within the past four weeks, but I learn that two have been admitted into the Stanley hospital. The two regiments named above have had about twenty-five cases each; the 45th and 46th Mass. had several; the 168th Pa. three or four, and the 43d Mass. one case. The disease was confined to the new troops that came out in November and December, 1862, unacclimated both to camp life and this locality. The 44th, 45th and 51st Mass. were quartered in barracks deficient in light and ventilation, with not more than 190 cubic feet of air to each man. The 3d, 5th, 43d and 46th Mass., the 168th and 174th Pa. were quartered in tents, the Sibley, I believe, but there were less than fifteen cases all told in these six regiments. The 17th and 24th Mass., the 85th N. Y. and 103d Pa. (old regiments) were also quartered in barracks of similar construction, but the disease did not make its appearance among them. While acting Medical Director I had the 51st ordered away, believing that the disease would thus be arrested. The regiment went out to Deep Gully, about ten miles distant, and camped for five days in shelter-tents. It rained three days out of the five. There have been no new cases since. The disease was arrested in the 44th in consequence of a similar move and the fact that the barracks of this regiment were whitewashed and improved during its temporary absence.

Dr. UPHAM regarded the disease as partaking of the nature of typhus in a severe and malignant form, and having in this instance a special direction to the membranes of the brain and spinal cord, as in other typhus epidemics, the weight of the morbific influence has at one time fallen on the brain, and at another on the lungs or other important thoracic or abdominal viscera. KNEELAND, on the contrary, supposed the disease due to malarial influences. He remarks in his Monthly Report for January as follows:

* FREDERICK D. LENTE, writing June 25, 1864, to the *American Medical Times*, gives the history of a case of *spotted fever* in which the synovial membranes were specially affected. The patient, Dr. C., 40th N. Y., age 43, was at the time of the attack, February, 1864, at a hotel in New York awaiting the embarkation of his regiment. One day soon after dinner he was taken with nausea and headache, soon followed by dizziness and feverishness. Next day he was somnolent and in the evening unconscious. Strong counter-irritation to the nape of the neck and along the spine restored consciousness before morning; but the patient was very weak and suffered from headache and mental confusion. On the third day the right eye was highly injected and the sight lost, with little or no pain then or subsequently. At this time his whole surface, with the exception of the face, was covered with purplish unelevated spots from the size of a pin-head to that of a three-cent piece; there was manifest effusion into the knee joints, and the extremities below the joints were tumefied; pain in the lumbar and sacral regions extended along the crest of the ilium and down the thigh to the knee. He continued for several weeks much prostrated and occasionally slightly delirious. A febrile movement occurred for some time every afternoon. The spots began to fade soon after they were first noticed, and disappeared in a few days; but on the exposed parts, as the hands, they dried into thick dark scales and peeled off. The tumefaction of the extremities subsided, but the joints continued affected in June, when the account of the case was written. The ball of the right eye had become atrophied and soft, the cornea hazy, the pupil contracted and insensible to light and the lens cataractous. The patient was gaining flesh; his general appearance was good; but he still complained of pain, aggravated by the slightest exercise—in fact he was perfectly at ease only when lying down. See also the case mentioned by BONTECOU in his report *supra*, page 553.

There have been five cases of what has been generally called "congestive fever," but as they differ very much from the congestive fever prevalent here in summer they have in this report been put under "brain fever," the symptoms and *post-mortem* appearances indicating the brain and its membranes as the seat of the disease. As the same disease was seen last summer here, occurring with, but markedly different from, congestive intermittent fever, the prognosis being different, it may be naturally inferred that they are distinct diseases, though originating probably from the same cause, malaria. Since this cause cannot ordinarily be supposed active at this season, I am inclined to seek its origin in the green pine wood of which the barracks are built; most if not all the cases have been in regiments quartered in barracks, and none, I think, in regiments living in tents or the city proper. The healthiest and stoutest men have been taken, and every case has terminated fatally; neither general nor local bleedings, sinapisms or other stimulating applications to the skin, quinine stimulants, mercurials or narcotics have had any perceptible effect in arresting the disease. After the occurrence of the first case, January 5, three grains of quinine were administered at night to every man going on guard, and afterwards coffee and hard bread were issued to the guard during the night. Of the five cases reported three died in camp and two in general hospital.

Twenty-seven cases from the records of the Stanley and Academy hospitals at New Berne are given below in the order of their occurrence:

Case 1.—Private Daniel B. Richmond, Co. H, 8th Mass., was taken Dec. 5, 1862, with pain in the bowels and back of the head and neck. He fainted while at the regimental sink, but recovered and returned to his tent, where he had a decided chill. Three or four hours later he was sent to hospital in an almost unconscious state—delirious, cold, breathing heavily and at times excited and incoherent; pulse 116, small, irregular and unequal; tongue dry and red; spots of purpura covered his arms and legs. Hot applications were prescribed, with ten grains of quinine in camphor-water and sweet spirit of nitre, to be repeated every four hours. On the 7th there were symptoms of iritis. On the 9th the dark spots were sloughing. Next day the mind became clear, but the cornea was opaque and green. After this the indications of cerebro-spinal meningitis gradually disappeared, but the iritis became chronic. Quinine was continued, with belladonna ointment and an occasional blister to the temple. The patient was discharged from the service March 27, 1863.

Case 2.—Frank Doughty, a deck-hand on steamer Patuxent; age 23; was admitted Dec. 20, 1862, violently excited and with contracted pupils and tenderness at the nape of the neck; his pulse was not much quickened. He improved for three weeks under calomel and ipecacuanha, with cups and blisters, but his mind continued confused. Iodide of potassium was tried for a week, during which he was able to sit up and give rational answers in most instances; but after this he became suddenly worse, and died Jan. 24, 1863. *Post-mortem* examination: The pia mater was much injected; yellowish lymph was deposited in the sulci of the upper surface of the brain and thick purulent matter in the pons Varolii and medulla oblongata; the lateral ventricles contained two ounces of serum. The spinal column was not examined. The thoracic and abdominal viscera were healthy.

Case 3.—Private John Cramer, Co. G, 132d N. Y.; age 17; was admitted Jan. 10, 1863, his previous history being unknown. He was delirious and had a hot and dry skin, frequent and feeble pulse, a dry tongue which was protruded with difficulty, dyspnœa, coldness of the extremities, lividity of the surface, a tympanitic abdomen and black, involuntary stools. He died on the 15th. The treatment consisted of the administration of one grain of blue mass every hour, two of quinia every two hours, whiskey and beef-tea, with hot applications to the back, abdomen and extremities; a grain of ipecacuanha was subsequently added to the mercurial, the quinia increased to three grains and towards the end of the case to five, when, also, blisters were applied to the chest and back of the neck. *Post-mortem* examination: Body livid. The membranes of the brain were somewhat congested, the arachnoid having a slightly clouded appearance; the cerebral substance presented a larger number of puncta than usual. The lungs were greatly engorged; the heart normal. The liver was slightly enlarged and congested; the spleen nearly double its usual size and greatly engorged; the kidneys normal. Some of Peyer's patches were thickened and friable, with apparent ulceration in one of them.

Case 4.—Private Elijah H. Wellington, Co. D, 45th Mass.; age 31; one of the healthiest and strongest men of his company, having been on duty all day Jan. 11, 1863, felt unwell in the evening and about midnight went to the regimental hospital to get medicine for a headache. Hoffmann's anodyne was given. Later in the night he had a severe chill with headache and pain in the bones, for which, next morning, ten grains each of calomel and quinine were administered, moving the bowels in a few hours but failing to relieve the headache. Nitrate of potash, Dover's powder, capsicum and quinine were given, after which he perspired freely and expressed himself as having less pain, although the headache persisted. At midnight he became comatose, his pupils fixed, one dilated, the other natural, and large ecchymoses appeared on the surface of the globes; the jaws were locked and respiration performed in a hissing manner through the tightly shut teeth, but there was no rigidity other than the trismus; pulse 125, moderately strong, compressible. At 2.30 A. M. of the 13th the respiration became slow and interrupted, the pulse fell, and death took place quietly. *Post-mortem* examination: Body well formed and nourished; conjunctivæ injected and ecchymosed. The meningeal vessels were engorged with blood; the cerebral masses were less firm than usual, the upper part of the left hemisphere being markedly softened. The heart was large and flabby, its right cavities filled with dark fluid blood. Both lungs were engorged with dark blood, especially in their posterior parts. The liver was nearly twice its usual size and weight, pale yellow, fatty and friable, its veins much engorged; the spleen was slightly congested; the kidneys enlarged; the other abdominal viscera healthy.

Case 5.—Private James McComb, Co. F, 45th Mass.; age 21; was admitted Jan. 14, 1863, in an algid condition, exhausted and delirious. He was seized on the 12th with a chill followed by high fever and delirium. He had been

treated by cups at the nape of the neck, quinine and stimulants. Delirium continued, with jactitation and subsultus; the pulse was 80 and very weak, the skin cool and moist, the respiration quiet and the bowels open. He died at midnight of the 15th. *Post-mortem* examination: Both ventricles of the brain were distended with a semi-opaque liquid having a pus-like deposit at the bottom; a lymph-like deposit was observed at the base of the cerebellum, and particularly about the origins of the nerves of sense, where it resembled a false membrane. The right lung was congested. The pericardium contained three ounces of serum. The liver, spleen and kidneys were normal. The stomach was slightly congested; Peyer's patches were somewhat prominent.

CASE 6.—Private George B. Young, Co. G, 44th Mass.; age 22; was admitted Jan. 14, 1863, having had a congestive attack on the previous morning, with intense headache and vomiting. Five ounces of blood were removed from the neck by cupping, and forty grains of quinine given in twenty-four hours. On admission his mind was clear although the pupils were dilated; pulse 86, moderately full; skin moist and cool; tongue moist and slightly furred; abdomen natural and bowels regular. He improved under treatment by quinine until the 29th, when, coincident with the occurrence of severe headache, the pulse became quick and full, the respiration embarrassed and the tongue dry. In the evening delirium supervened, but subsided gradually, so that on February 1 the patient's mind was again quite clear; nevertheless the headache continued with convergent strabismus of the right eye; a slight diarrhœa also occurred. Next day he appeared somewhat better, but on the 3d he died rather suddenly without any symptoms of exhaustion. *Post-mortem* examination: Body but little emaciated. There was some cloudiness of the arachnoid and a slight subjacent deposit of lymph in the sulci of the upper cerebral surface; the cerebellum and medulla oblongata were covered on the inferior aspect by a layer of lymph about one-sixth of an inch in thickness, firm and ligamentous in texture; both lateral ventricles contained about an ounce of flaky liquid with a small quantity of pus in the inferior horns; the cerebral substance was of natural consistence. The lungs were slightly congested in their posterior parts. The heart and abdominal viscera were healthy.

CASE 7.—Private O. W. Washburn, Co. B, 10th Conn.; age 22; was admitted Jan. 15, 1863, having been suddenly attacked on the 13th with fever and violent headache. On admission the patient was delirious and frequently attempted to get out of bed; the pulse was 79, full and moderately strong; the skin hot; the face dusky; the respiration easy. An ounce of wine every two hours, six grains of quinine every three hours and fifteen grains of calomel as a cathartic were prescribed; carbonate of ammonia was given subsequently. The fever declined but the delirium increased; a few spots appeared on the left forearm. Death occurred on the 22d. *Post-mortem* examination found the dura mater healthy, but the upper surface of the brain slightly engorged; around the origin of the nerves of sense and upon the medulla oblongata, sheathing it completely, was a deposit of consistent pus-like lymph, about two lines in thickness, extending thence into the crevices of the brain; a similar deposit was also found in the lateral ventricles together with a copious dirty-looking, semi-opaque liquid. The heart was normal. The left lung was hepatized red and its bronchial tubes filled with a lymph-like substance, tenacious enough to be pulled out with a forceps. The stomach and kidneys were normal; the liver slightly congested; the spleen small and light colored; Peyer's patches normal.

CASE 8.—Private J. Moody, Co. F, 44th Mass.; age 21; was admitted unconscious and with insensible pupils Jan. 16, 1863, having been suddenly and violently taken sick during the previous night. He had frequent epileptic spasms. He died on the 17th. *Post-mortem* examination: The membranes of the brain were much congested, the substance slightly congested; a pus-colored liquid was found in the ventricles, on the base of the brain and on the lobes of the cerebellum. The lungs were congested, especially in their posterior parts. The heart contained a fibrinous deposit in both ventricles. The stomach, intestines, liver and kidneys were healthy. The spleen was of normal size but highly congested.

CASE 9.—Private S. Parsons, Co. F, 51st Mass.; age 32; was admitted Jan. 16, 1863, in a moribund condition, having been taken sick suddenly on the previous day. Quinine and whiskey with capsicum were freely given, and an enema of brandy and oil of turpentine administered. Next morning his head was thrown back and he groaned heavily as if in great pain; he was roused with difficulty; the pulse was 120 and weak, skin moist and moderately warm, tongue dry and dark; sordes appeared on the teeth and petechiæ on the limbs. He died on the morning of the 18th. *Post-mortem* examination: Body not emaciated; rigor strongly marked; a few petechial spots on the arms and hands. The membranes of the brain were engorged with venous blood, and underlying them a purulent lymph-like substance was spread over the surface of the hemispheres, on the base and lobes of the cerebellum, and more abundantly on the surface of the medulla oblongata and about the origin of the cerebral nerves; a similar substance, but thicker and more opaque, was found in the lateral ventricles. The lungs were congested posteriorly. The inner surface of the pericardium was uniformly congested and covered with diffluent lymph; the ventricles were filled with dark fluid blood which afterwards clotted in the basin. The spleen was of a deep maroon color, enlarged and slightly softened; the liver and kidneys healthy. The intestines were normal with the exception of a slight thickening of one or two of Peyer's patches, and in one of them a loss of substance not amounting to ulceration.

CASE 10.—Private J. W. Merrill, Co. F, 45th Mass.; age 21; admitted Jan. 17, 1863. Died 20th. *Post-mortem* examination: The surface of the cerebrum beneath the arachnoid was covered with a questionable diffluent and greenish-yellow lymph, most abundant along the longitudinal fissure and in the sulci between the hemispheres; a larger deposit was found at the base of the cerebellum, between its lobes as well as over its surface; there was a free deposit also at the crossing of the optic nerves, along the roots of the nerves generally and in the posterior horn of the left lateral ventricle; the pia mater seemed normal. The cavities of the heart contained firm fibrinous clots. The abdominal organs were healthy.

CASE 11.—Private Frank L. Moore, Co. I, 51st Mass.; age 27; was admitted Jan. 18, 1863, having been taken with a chill on the previous evening. He was in a state of semi-stupor; pulse 85, feeble; extremities cool; tongue

clean. The case was treated with quinine, calomel and cupping, but no improvement was manifested until the 24th, when medication was discontinued. A day or two after this he had pain in the face and head, tenderness at the nape of the neck and hebetude of mind. At times his symptoms appeared neuralgic and at other times inflammatory. He was treated with quinine, calomel, cups, tonics, stimulants and counter-irritation, and on March 7 was gaining strength and taking iron and fluid extract of cinchona as a convalescent. He was sent to Foster hospital on April 8 [where he died of cerebro-spinal meningitis on the 26th].

Case 12.—Private Walter Bradbury, Co. C, 44th Mass., was taken Jan. 19, 1863, with chills, followed by hot skin, full, quick and frequent pulse, the surface soon afterwards becoming cool and moist. During the day eighty grains of quinine were administered with stimulants and beef-tea, and the patient was cupped to the extent of five ounces. His condition on admission to hospital at 7 P. M. was as follows: Intense headache but no active delirium; recognized his friends readily; intelligence good when aroused; general powers good; some deafness; face dusky; eyes natural; lies upon right side; tongue dry, tending to brown at base, with a pasty yellowish stripe along its sides, natural at tip; respiration 28; some dulness on percussion; mucous râles at left base; pulse regular, rather full, hard, 132; skin moderately warm, somewhat moist and covered, except on the face, with typhus-like spots from the size of a pin-head to a split pea, dark-colored, persistent, not prominent to the touch but seemingly imbedded in the substance of the skin; there was slight fulness of the abdomen; an enema of turpentine had produced one dejection. Active delirium soon after set in accompanied with spasms of the facial muscles and convergent strabismus. There was tumultuous action of the heart with a well-defined triplicate sound. The patient gradually grew worse till his death, which occurred without much apparent exhaustion on the 22d.

Case 13.—Private Charles Burdock, Co. H, 10th Conn.; age 18; was admitted Jan. 19, 1863, in a moribund condition, having been attacked the day before with chills, headache and delirium. To relieve these symptoms cups to the back of the neck, cathartics and the free use of quinia had been resorted to. On admission the respiration was 44, irregular, difficult and accompanied with groaning; the skin had a mottled or petechial appearance. He died at 4 P. M. *Post-mortem* examination: The brain was but slightly congested; at its base was a deposit or membrane-like exudation with a pus-colored fluid, most abundant around the origin of the nerves of sense and on the base of the cerebellum; a simular exudation was found in the ventricles. The lungs were extensively congested and in their superior portions tuberculous; they presented some well-defined spots resembling those of pulmonary apoplexy. The heart contained large fibrinous clots in both ventricles. The liver and spleen were enlarged and congested, the latter being twice its normal size. The kidneys and intestines were normal.

Case 14.—Private George Boynton, Co. G, 44th Mass.; age 21; was suddenly seized with symptoms of a severe cold and some disposition to paralysis of the tongue and muscles of the face. Incomplete reaction came on after cupping the nape of the neck to the amount of five ounces and administering quinine in half-drachm doses, with stimulants and beef-tea. Delirium supervened Jan. 19, 1863, and a few hours afterward he was admitted from the regimental hospital in a state approaching collapse; he died shortly after admission. *Post-mortem* examination: Arms, chest and legs studded with petechial spots from one to three lines in diameter. There was but little congestion of the cerebral membranes, although the arachnoid was slightly opaque. The lungs were engorged, especially at the posterior and dependent portions. The pericardium contained six or eight ounces of sero-purulent liquid with large masses of flocculent lymph floating in it; its surface was covered with a layer of lymph, membranous in tenacity and thickness; the ventricles contained fibrinous clots. The liver, spleen, kidneys and intestines were normal.

Case 15.—See case of private Davis N. Hosmer, No. 303 of the *post-mortem* records of the continued fevers.

Case 16.—Private Edwin F. Whitney, Co. H, 5th Mass.; age 18; was admitted Jan. 30, 1863, with violent delirium and opisthotonos, which came on after a slight chill on the previous afternoon. His pulse was full, 90; tongue clean and moist; nape of neck tender. A powder containing two grains of calomel and half a grain of ipecacuanha was given every two hours, with wet cups to the neck and mustard to the spine. He died on the morning of February 3. *Post-mortem* examination: There was a deposit of lymph on the upper surface of the cerebrum and cerebellum and some effusion in the ventricles; the bloodvessels of the brain were much engorged. The thoracic and abdominal viscera were healthy.

Case 17.—Private Forrest L. Whittridge, Co. I, 44th Mass.; age 20; was admitted Jan. 31, 1863, having had a chill at noon, followed by a slight febrile action. One cathartic pill was given at bedtime. Next day at noon he was suddenly seized with violent delirium and great excitement, requiring force to restrain him in bed; pulse 90; pupils contracted; back of neck tender. Applied cups to the neck, mustard to the spine and extremities and gave eight grains of quinine and five of calomel, the dose to be repeated at 9 P. M. and at six o'clock next morning. On February 2, the symptoms being unchanged, two grains of calomel and half a grain of ipecacuanha were ordered and the cupping repeated. This treatment was continued until the 5th, when conjunctivitis was developed with an eczematous eruption around the lids. The patient became weaker but the delirium lessened. Half an ounce of whiskey with milk was given every three hours and two grains each of calomel and quinine every four hours. Next day the delirium subsided and the patient gradually recovered without further medication than that directed locally to the eyes. On March 7 he was sitting up and appeared to be well but for the conjunctivitis. [He was transferred to Foster hospital April 8, and discharged from service May 2, 1863.]

Case 18.—Private Henry G. Longley, Co. C, 51st Mass.; age 21; was admitted Feb. 2, 1863. While in perfect health this man had been taken with chilliness followed by violent delirium, during which his pulse was full, 85, skin moist and tongue clean and moist. Cups were applied to the nape of the neck, mustard to the spine and extremities, and two compound cathartic pills were given with repeated doses of calomel and quinine, ipecacuanha being afterwards substituted for the latter. On the 5th opisthotonos was developed and the pulse became more rapid

and feeble. After this the case progressed slowly, the mind frequently dwelling on erotic subjects. At the end of the second week the spasm of the muscles of the neck relaxed, but ten days later it returned, and he died on the 24th. His nourishment consisted chiefly of milk-punch. *Post-mortem* examination: The cerebral membranes were very red and the sinuses filled with black blood; the brain was somewhat softened and its ventricles contained three ounces of serum; the medulla oblongata and spinal cord were covered with a thick yellowish exudation, and the sheath of the cord contained a yellowish effusion.

Case 19.—Private Jno. D. Manter, Co. B, 3d Mass., was admitted Feb. 4, 1863, having been taken sick on the previous day. He had violent delirium; pulse feeble, 80. The treatment consisted of cups to the neck, mustard to the spine, turpentine enemata and repeated doses of calomel and ipecacuanha. He died on the morning of the 6th. *Post-mortem* examination: The pia mater of the brain was congested and lymph was deposited in the sulci and over the medulla oblongata and pons Varolii; the pia mater of the cord was congested and the sheath, in the lower dorsal region, contained some effusion.

Case 20.—Private Henry J. Kendall, Co. C, 51st Mass.; age 19; was admitted Feb. 4, 1863, having been taken sick on the night of the 2d with chilliness and headache, followed next day by delirium, for which large doses of quinine had been given. On admission he was quite delirious, and the cervical spine was so tender that he cried out violently when pressure was made over it; the pupils were contracted, tongue clean and moist, pulse 84 and full. He was treated with wet cups, mustard, turpentine enemata and calomel and ipecacuanha. Next day the head was thrown back by spasm of the muscles. On the 6th the pulse became quick and feeble, the other symptoms remaining unchanged. Beef-tea, milk and whiskey, with small doses of quinine and calomel were taken. Not until March 3 did the mind become clear, after which the patient continued to improve slowly. On April 8th he was transferred to the Foster hospital. [The records of this hospital show that Kendall died April 19, of cerebro-spinal meningitis.]

Case 21.—Corporal Austin A. Darling, Co. K, 51st Mass.; age 19, taken with headache and chilliness on the evening of Feb. 10, 1863; admitted next day in a state of violent delirium; pulse 90 and feeble; countenance pale; pupils contracted; skin moist; tongue furred and moist. He was treated with cups, mustard, turpentine enemata, quinine, calomel, ipecacuanha and milk-punch. His bowels were moved, but his condition otherwise remained unchanged until the 14th, when the tongue became swollen and dry, the throat slightly reddened and the pupils contracted. Cups and blisters were applied to the back of the neck. After this he became weak, pulse 120, mind dull and pupils dilated. He died on the 17th. *Post-mortem* examination: The sinuses of the brain were engorged with blood; the pia mater uniformly injected; a deposit of yellow lymph covered the cerebrum, cerebellum, pons, medulla oblongata and spinal cord; serum with some pus was contained in the ventricles, and a yellowish liquid in the sheath of the cord. [The medulla oblongata and cerebellum of this case constitute *Specimen* 32, Army Medical Museum. The lymph masses which originally coated their surface were to a great extent washed away during the transportation of the specimen to the Museum.]

Case 22.—Corporal Edwin H. Bliss, Co. C, 51st Mass.; age 23 years; was taken with violent headache early in the morning, Feb. 11, 1863, and admitted in the evening: Pulse 106, respiration hurried, pupils natural, tongue dryish and skin moist. Cups were applied to the back of the neck and mustard over the spine; a turpentine enema was given, and quinine, calomel and ipecacuanha by the mouth. His bowels were opened so freely that opiates had to be used; but in other respects his condition remained unchanged until the 14th, when the pulse fell to 80, the pupils became contracted, the eyes injected and the tongue dry and brown A blister was applied to the back of the neck. Next day the pulse had risen to 130; he was very feeble and bathed in perspiration; he died at 10 P. M. *Post-mortem* examination: The sinuses of the brain were engorged with black blood; the pia mater highly injected; one ounce of serum was found in the lateral ventricles and a deposit of lymph over the entire surface of the cerebrum, cerebellum, medulla oblongata and spinal cord. The thoracic and abdominal viscera were healthy. [*Specimen* 33, Army Medical Museum, is from this case—a piece of the right lobe of the cerebrum on which, near the middle of the longitudinal fissure, is an opaque layer of lymph.]

Case 23.—Private George W Moore, Co. C, 5th Mass., was taken Feb. 11, 1863, with nausea, vomiting, headache and depressed circulation, and admitted at 6 P. M. almost pulseless, stupid and with contracted pupils. Cups, mustard, turpentine enemata, and calomel at first as a purgative and afterwards in two-grain doses, with ipecacuanha, were employed, but without result until midnight of the 12th, when the bowels were moved several times, after which the calomel was discontinued. Next morning he showed signs of salivation, and in the evening was rational, answering questions clearly and readily; his pupils also had become sensitive to light. The case progressed with copious salivation, but with no other untoward event, until March 10, when the patient was returned to duty.

Case 24.—Private Charles W. Haven, Co. C, 51st Mass.; age 18; was taken sick on the morning of Feb. 17, 1863, and admitted at 6 P. M. He was unconscious but very restless, his skin and pupils natural, pulse 90 and full. The removal of twenty-four ounces of black blood caused the patient to remain quiet for twenty minutes, but thereafter the jactitation became aggravated. A turpentine enema was given, and a powder consisting of five grains of calomel and two each of opium and camphor was vomited as soon as swallowed. At 8 P. M. the powder was repeated and retained. Muscular action being very violent and the pulse 86 and strong, sixteen ounces of blood were removed while the patient was held upright in bed, but no syncope resulted nor any diminution of the muscular action. Two grains of calomel were ordered to be taken every two hours. Death occurred at 8 P. M. of the 18th. *Post-mortem* examination: The bloodvessels of the brain were much congested and the dura mater strongly adherent to the skull along the longitudinal sinus; the entire surface of the cerebrum and medulla oblongata was clouded; the ventricles contained one ounce of effused serum, and the choroid vessels were much congested; the spinal cord presented evidences of inflammation along its whole length and the lower part of the canal contained turbid serum.

Case 25.—Private L. G. Parker, Co. G, 45th Mass., was admitted Feb. 19. 1863, having had a slight chill on the 17th, followed quickly by fever and delirium. On admission he was wholly unconscious, pulse 124, small and corded, surface hot, tongue dry and covered with a dark fur, respiration somewhat accelerated, abdomen natural and bowels regular; there were petechial spots on the arms and breast. Decided relief followed the removal of eighteen ounces of blood; the patient became semiconscious, the pulse fuller and less frequent and the respiration easier. As deglutition was impossible quinine and turpentine were given by injection every three hours. His progress was gradual but satisfactory. On the 24th he was perfectly rational, pulse 110, respiration 16, skin moist and cool. A slight diarrhœa occurred about this time. Next day he asked for more food, and on March 4, his strength being good, he insisted upon getting up. After this his pulse fell to 70 and he was manifestly improving, when, on the 10th, his skin became hot and dry and delirium recurred, with frontal headache and great pain in the limbs and back of the neck, which persisted with more or less intensity until the 18th, when he became unconscious, muttering and sometimes singing in a low delirium and catching at objects real or imaginary. Bedsores appeared about the 15th. On the 20th he answered questions correctly and then relapsed into stupor; vision was lost or greatly impaired. Next day the head was persistently thrown back. On the 22d an eruption appeared on the face and abdomen; the tongue was dry, brown and cracked. On the 24th the patient possessed no intelligence; his limbs were cold; he died at midnight. *Post-mortem* examination: Body but little emaciated; rigor mortis well marked. The cerebral membranes presented no unusual appearance on their external aspect, but the veins beneath were somewhat engorged; the surface of the cerebrum showed spots of thin milky fluid with clots of pus-like lymph near the longitudinal fissure; on its base, covering the origins of the nerves of sense, pons Varolii, medulla oblongata, posterior fissures of the cerebellum, and apparently extending down the spinal cord, was a mass of tenacious yellowish lymph three-eighths of an inch in thickness and by estimate from half to three-fourths of an ounce in quantity. A deep longitudinal incision through the pons and medulla oblongata caused three ounces of slightly clouded serum to well up with some force; the lateral ventricles were filled with serum holding in suspension a quantity of pus-like matter. The lungs were healthy; the pericardium normal; the right ventricle of the heart contained two or three drachms of "partially organized lymph." The liver was normal; the gall-bladder distended with dark liquid bile; the spleen natural. One of Peyer's patches was a little thickened and others presented the shaven-beard appearance, but otherwise the intestines were healthy.

Case 26.—Private Perley Goddard, Co. E, 51st Mass.; age 28 years; was admitted Feb. 22, 1863, having been taken suddenly sick with headache and pain in the back of neck; pulse 90 and full; tongue clean and moist. Cups to the neck, mustard to the spine, with a purgative of calomel and jalap were ordered. The bowels were freely opened during the night, and next day powders of calomel and ipecacuanha were directed to be given every four hours, and continued until the 28th, when the improved condition of the patient warranted their discontinuance. He was returned to duty March 10.

Case 27.—Private A. Wolf, Co. D, 103d Pa.; age 20; was admitted March 17, 1863, having been taken sick on the previous night while on picket after a fatiguing march of sixty miles in two days. The attack began with a chill and vomiting, followed by headache, pain in the limbs, fever, jactitation and next morning delirium. On admission he was collapsed and pulseless, yet the restlessness continued; his skin was cold and livid and covered, on the legs and body, with purpuric spots. He was violently restless until death took place at 11 P. M. *Post-mortem* examination: Body well developed, rigid and almost covered with purpura. A thin layer of lymph coated the upper surface of the cerebral hemispheres and to a less extent the base of the cerebellum, the medulla oblongata and the origins of the nerves of sense; lymph was also seen in the lateral ventricles and "a fungoid growth appeared attached to the floor of each ventricle, being each about fifteen lines long and four lines thick;" the spinal cord, examined to the extent of three inches, was apparently healthy. The cavities of the heart were filled with firm lymph of a bright lemon color,—the right auricle containing a complete cast of the cavity, with an extension into the superior cava. The lungs were congested. The liver was one-half larger than usual and somewhat congested; the spleen enlarged, congested and softened; the kidneys healthy but with a small quantity of fluid lymph in the pelvis of each. The stomach and intestines were healthy.

Eleven of the New Berne cases were reported briefly by Surgeon Morong of the Foster hospital. Two of these cases made a perfect recovery:

Private John Hook, Co. G, Marine Artillery, was admitted Dec. 30, 1862, with opisthotonos strongly marked. On the third day the muscles of the neck and back became so rigidly contracted as to prevent the patient from lying flat on his back. He was returned to quarters on the twelfth day perfectly convalescent. Treatment was by wet cups to the neck, beef-tea and stimulants.

Private Henry E. Fuller, Co. G, 43d Mass., was admitted Jan. 3, 1863, and returned to quarters March 12.

Two others recovered, one with partial paralysis of the face, the other with complete deafness. Seven cases died, but in one only was an examination made after death;—the usual inflammatory deposits were discovered.

During the continuance of the epidemic at New Berne some cases occurred in the 11th Me. and 104th Pa. on the coast of South Carolina. These regiments, aggregating 1,200 men, had been confined for twenty-two days on board the transport *Cahawba*. On the twentieth day a member of the 104th died of congestive fever. Next day two men of the 11th were attacked, one of whom died on that day. The regiments landed February 10, and within a week after this seven men died. A board of medical officers, consisting of

Surgeons W. S. Woods, 52d Pa., M. S. Kittinger, 100th N. Y., and W. T. Robinson, 104th Pa., convened to inquire into the causation and prevention of this deadly affection, reported it due to malaria, ochlesis and deficiency of food.

The Medical Board appointed to enquire into the causes of mortality in the 11th Maine regiment met Feb. 25, 1863, at St. Helena Island, S. C., and respectfully report that they have made a careful investigation into the circumstances attendant upon the sickness and deaths lately reported; that they have inspected thoroughly the location of the camp and the condition of the men as to cleanliness and health, the manner of cooking, the policing of the camp and the situation of the sinks; that they have attended the Surgeon's call and carefully examined the cases that were presented for treatment and the prescriptions for these cases; that they have examined the records of the sanitary condition of the regiment for the past six months, and find that the fatality attendant upon cases occurring in this command is accounted for in their minds by the knowledge of the fact that five-sixths of the cases that have proved fatal were in the persons of recruits enlisted in the State of Maine in August, 1862, and transferred thence to Yorktown, Va., in September: These men came from the northern counties of the state, where the miasmatic influences of a southern climate, so productive of disease to those unused to the exposure, are entirely unknown, at a season, too, when this miasm was most alive in all its deadly violence, and on their arrival at Yorktown they occupied a camping ground notoriously unhealthy and unfit by its peculiar location for the occupancy of any troops at that season of the year. These recruits, suddenly transferred from civil to military life, from the active duties of home life to the more confined and passive duties of garrison life, and subject to this poison of miasm in all its malignity, soon succumbed to its baneful influence, many dying during their first months of service and many others remaining prostrated by disease. This was the condition of things from which the regiment was slowly rallying when it left that place for active service in December, the constitutions of the men so sadly impaired that climatic influences, producing no serious consequences to troops perfectly healthy and strong, proved more than their weakened systems could bear and almost necessarily fatal. Certain influences not climatic had great weight in connection with this matter, as for instance the impaction of the command for twenty-two days on the transport *Cahawba*. Many of the men occupied the upper deck and were subjected, with scarcely any protection from the weather, to great and sudden changes of temperature; others were crowded almost to suffocation in confined and badly policed quarters below. During this time the regiment was obliged to subsist on half rations for want of proper facilities for cooking. The policing of the camp was found by inspection to be thorough and the men creditably neat in their persons and clothing. The reasons here given are in our minds sufficient to account for the peculiar susceptibility of the men of this regiment to climatic diseases.

This regiment, the 11th Maine, had a few similar cases in April, after a confinement of eight days on board a transport. Medical Inspector W. H. Mussey, who was present at the *post-mortem* examination of one of these cases, considered that clinically and anatomically the fatal affection was identical with that which was prevailing at New Berne.

Exclusive of these outbreaks in North and South Carolina, only five cases suggestive of the presence of cerebro-spinal meningitis were recorded during 1863. But in this connection reference should be made to the cases reported as congestive fever.*

Case 28.—Private Oscar Rondebush, Co. E, 111th Pa.; age 22 years; was admitted Feb. 15, 1863, with aphonia. On March 26th the conjunctiva became slightly congested, and next day he complained of severe pains in the back and tightness across the temples; his voice returned and his cries of pain were heard at a distance of sixty rods. Cold water was applied to the small of the back and morphia administered every two hours, producing considerable relief and some sleep during the night. On the 28th the pulse was 120, very weak and compressible; the ocular conjunctiva chemosed and nearly black; the skin purple with dark spots, not removed by pressure; the tongue covered with a thick dirty-white coat; blood oozed into the mouth, giving a sweetish taste to everything, and the urine looked like blood. At 8 P. M. the pulse was 130; respiration 30; temperature 110°. At 3 P. M. of the 29th violent delirium came on, followed by coma and death next morning. *Post-mortem* examination: Rigor mortis marked; body muscular; trunk and extremities, even to the fingers and toes, covered with dark-purple spots about one and a half lines in diameter, which did not disappear on pressure; face comparatively free from purple spots; ocular conjunctiva ecchymosed and overlapping the cornea; pupils each two lines in diameter. The brain appeared healthy. The mucous membrane of the larynx and trachea were softened and discolored with purple spots. There was some hypostatic congestion of the lungs; the pleura presented reddish and purplish patches of irregular shape. An ecchymosis two inches long was found at the base of the pericardium, and there were black spots under its visceral portion; ecchymoses were also found in the right auricle, on the outer aspect of the pulmonary artery and between the aorta and the œsophagus. The mucous membrane of the œsophagus was eroded in two places, each nine lines in length. The peritoneum was ecchymosed in spots. The liver, ninety-four ounces, was pale in color; the pancreas, four and a quarter ounces, was also pale; the spleen, fourteen ounces and a half, was reddish-purple and firm. The mucous membrane of the stomach was much congested and covered with bright red spots, especially at its fundus. The duodenum was small and its mucous membrane of a dull ochre color. The villi of the small intestine were highly injected; Peyer's patches were congested and one was ecchymosed; the solitary glands were somewhat enlarged. The vermiform appendix was

* See *supra*, page 140 *et seq.*

ecchymosed; the large intestine was distended and its mucous membrane covered with bright red spots. The right kidney, ten ounces, was covered with ecchymoses, its pyramids dark-colored, pelvis and ureter disintegrated, roughened, mammillated and dark red; the left kidney, eleven ounces, was ecchymosed; the pelvis blackish and roughened with minute papillæ, the cortical substance of a bright pink color; the mucous membrane of the bladder was ecchymosed.—*Lincoln Hospital, Washington, D. C.*

Case 29.—Private Alexander Smedes, Co. K, 25th N. Y., was admitted June 22, 1863, in a comatose condition. Nothing of his previous history was ascertained except that he had been ill but a short time and had been delirious. He died on the 24th. *Post-mortem* examination: There was an abundance of lymph beneath the arachnoid, at the superior and lateral portions of the cerebrum and at the inferior portion of the cerebellum. The liver and kidneys were fatty and the urine albuminous.—*Act. Ass't Surg. Austin Flint, Ladies' Home Hospital, New York.*

Case 30.—Private Charles V. Woolard, Co. F, 115th Ill., was admitted Sept. 12, 1863, with severe headache, confusion of mind, giddiness, staggering gait and a small and wiry pulse, 120. His lower extremities were paralyzed on the 17th. Next day the paralysis became general and he died. *Post-mortem* examination: Body well nourished. The membranes of the brain were opaque and thickened; they contained a large quantity of serum and their vessels were distended with dark blood; the brain-substance was healthy, but the lateral ventricles contained two ounces of turbid serum. The spinal vessels were highly injected and the membranes inflamed in the cervical region, beyond which the examination was not carried.—*Hospital, Tullahoma, Tenn.*

Case 31.—Private S. C. Scott, Co. I, 25th Iowa, was admitted Nov. 14, 1863, with active cerebral symptoms. Coma supervened on the 18th, on which day he died. *Post-mortem* examination: Body well nourished. The vessels of the dura mater were distended with dark blood; a few patches of lymph were found on the surface of the convolutions and an ounce of clear serum in the ventricles, but the substance of the brain was healthy. The abdominal cavity presented evidences of general peritonitis; it contained eight ounces of straw-colored serum. There were patches of inflammation in the ileum; otherwise the intestine was healthy.—*Hospital, Tullahoma, Tenn.*

Case 32.—Sergeant-Major Philip Beaufort, 33d N. J., was admitted Dec. 18, 1863. While on the march he was taken with a chill followed by fever, constipation, headache and inability to sleep. On admission he had severe pain and great tenderness in the lower part of the spine, shooting pains in the thighs, obstinate constipation, headache, delirium and wakefulness. He afterwards suffered from constriction about the abdomen, dysuria, opisthotonos and gradual loss of motion and sensation in the left arm and both lower extremities; there was hyperæsthesia with a wheal of large size on the anterior surface of the trunk; his pupils were dilated; he had frequent rigors and was usually delirious. After a continuance of two weeks these symptoms began to subside; the head symptoms disappeared and the spasms became less frequent. The paralysis of the lower extremities continued for some time after the dysuria and constipation had ceased. Sensation returned by degrees, and afterwards motion. Treatment consisted of counter-irritants to the spine, purgatives, calomel and conium, and lastly iodide of potassium and tonics, with iodine as a local application.—*Act. Ass't Surgeon J. W. Digby, Hospital, Chattanooga, Tenn.**

The following extract from the report for January, 1864, of Surgeon Ed. E. Phelps, U. S. Vols., General hospital, Brattleboro', Vermont, refers to the occurrence of the disease among the recruits stationed in the barracks at that place:

During this month recruits have been assembled at the U. S. Barracks, less than half a mile from this hospital, and their sick form the greater part of those brought under my care. Among them, it will be seen, are six cases of cerebro-spinal meningitis. These were brought in presenting a variety of symptoms, having been attacked suddenly with nausea and vomiting or with violent headache; two were admitted in a state approaching collapse. They have all died but one. In these cases the ordinary symptoms of epidemic cerebro-spinal meningitis were observed,—nausea and vomiting, cephalalgia, rachialgia, delirium, retraction of the head, obstinate costiveness, loss of consciousness, cutaneous eruptions, together with the accidental or less constant symptoms of temporary or fugitive febrile reaction and moderate paralysis. Nausea and vomiting, which were not always the earliest symptoms, were neither severe nor obstinate. Cephalalgia was the most prominent and constant of the symptoms; it occurred early, and although remitting, did not entirely disappear until consciousness was lost. The pain was usually in the frontal region at first, but as the disease progressed it became more general, extending to the occiput, neck and back. It was described as hard and steady; the patient complained of it but did not cry out from its intensity. Opium, when used, had a happy effect in moderating it. Rachialgia was present in one-half of the cases but was by no means severe, and was much although not entirely relieved by dry cupping and opium. Delirium was noticed in all, in some low and muttering, in others more active; the patient could easily be aroused by a direct question, which would be answered correctly. It did not persist continuously during the progress of the disease but occasionally intermitted. Retraction of the head was but slightly marked in two of the cases; in the others it was a prominent and characteristic symptom; in two it entirely prevented the dorsal decubitus and in one the head was twisted on the neck. In those cases in which it was severe it continued throughout the attack. Obstinate constipation existed in all, occurring somewhat earlier in some than in others. Loss of consciousness was of gradual origin except in two cases, in which it was sudden and the earliest evidence of the disease; usually it was not a prominent symptom until the later stages; most of the patients died comatose. Cutaneous eruptions were present in three of the cases; they were herpetic and appeared on the face and neck; in one a petechial discoloration was noticed on the parts of the body subjected to pressure. Febrile reaction was incomplete in every case; at times a hectic condition was developed in a few hours,

* Dr. Roberts Bartholow published this case in the *Cincinnati Lancet and Observer*, July, 1864.

but in all the cases the skin was not inclined to be above the normal temperature. Insomnia, nervous agitation, paralysis and diarrhœa seemed to be accidental symptoms, occurring each in only a single case. *Post-mortem* examination in all except one revealed the following appearances: Opacity of the arachnoid, both cerebral and spinal, and injection of the cerebral pia mater; exudation of yellowish and brownish serum beneath the arachnoid and in the cavities of the brain varying from two to eight ounces; copious infiltration of the choroid plexus with turbid serum and purulent exudation beneath the arachnoid in the meshes of the pia mater. In some cases nearly two ounces of pus covered the base of the brain in front of the pons Varolii and extended by the side of the medulla oblongata and spinal cord quite into the lower dorsal region. The pus varied in character, in some fluid or semifluid and in others thicker; it was nearly concrete in one case on the lateral aspect of the spinal cord and on the top of the cerebrum, dipping down between the convolutions. Microscopic examination showed it to consist of a sparingly fibrous stroma, with pus corpuscles more or less changed and an immense number of fat globules. The thoracic and abdominal viscera were generally but little altered. The spleen was usually very small and hard; its section showed a surface much studded with white shreds as of newly-organized material. The liver in all cases was small, rather hard and fatty. In fact most of the tissues, while they appeared to the eye natural, were highly charged with fat. Such was the case with the heart, the muscles of the thorax, the walls of the intestines and the kidneys. Pus in small quantity was found in the pelvis of one kidney.

Dr. S. W. Bowles, on duty as assistant at this hospital, gives further information concerning these cases: *

Of eight patients, two lived two days, one four days, one five days, one nine days, one twenty-eight days, one thirty days and one recovered. The last case was subject to the whole catalogue of diagnostic symptoms for twenty-four to thirty-six hours, after which the patient was quite himself in every way for several days. Repeated relapses were followed by intermissions of increasing duration until convalescence was established.

The disease manifested itself in the northern part of the state before appearing at the barracks. It caused deaths in the town after its appearance at the barracks, but no case originated in the hospital, although the cases received were not isolated from patients affected with other diseases. Some of the recruits who left the barracks and returned to their homes were seized with the disease after their arrival at home. The barracks were in a remarkably healthy location; they were well ventilated and moderately clean. For a month before the outbreak they had been crowded; each building contained a hundred men, the strength of the camp being two thousand. The rations were of the best quality and well cooked. The weather for a month before and at the time of the outbreak was good winter weather.

Dr. Bowles states that there had been no typhoid or typhus fever during the winter; but in one of the protracted cases of cerebro-spinal meningitis examined by him the patches of Peyer were slightly ulcerated, and the monthly reports of the hospital show that in November, 1863, fifteen cases of typhoid were admitted, in December fifteen cases in January, 1864, six cases and in February four cases.

Acting Asst. Surgeon J. Thorne refers, in a report dated January 1, 1864, to the prevalence of this disease in the hospital at Kansas City, Mo.:

Cerebro-spinal meningitis has lately been prevailing in this district. In the report of this hospital for the month of November a death reported as typhus should have been credited to this disease. A strong typhous condition is undoubtedly present. The patient is taken with a chill, the pulse rising to 100 or 120; intense pain in some particular spot along the course of some of the larger nerves near their origin, but usually no headache; complete paralysis of some of the limbs involving both motion and sensation, the paralytic influence being in certain cases metastatic. The whole body becomes covered with large petechiæ containing grumous blood. If punctured phlegmonous erysipelas at once supervenes. Obstinate constipation is usually present. The lungs are generally oppressed, and upon percussion more or less dulness is frequently detected. A few hours after the disease has manifested itself delirium sets in with opisthotonos, wild rolling of the eyes, stertorous breathing and heat in the occiput. These symptoms terminate in death in from six to twenty-four hours.

Quinia seems to be powerless; opium and stimulants have succeeded better. Counter-irritants at the occiput develope erysipelas; along the course of the spine they prove of great value. Iron, opium, stimulants and counter-irritants constitute my present treatment. Of seven cases during the month of December, 1863, three have died. Recovery is tedious, and during convalescence ulcers form in various parts of the body and erysipelas appears upon the slightest irritation. The organs of special sense are deranged and there is a constant tendency to ulceration in cicatrices. Every indication of an irritated condition of the blood is present.

I have examined *post-mortem* in five cases during the month. The following is an illustrative specimen: John Martin, a Wyandotte Indian, private, Co. E, 15th Kansas Cav.; age 22. Body covered with large petechiæ. Nearly three ounces of purulent serum were found between the membranes of the brain; the spinal cord contained a large quantity of similar liquid. The membranes adhered to each other by lymph, principally along the longitudinal fissure. Adhesions covered the cerebellum over its whole surface, also the pons Varolii, medulla oblongata and nerves arising therefrom. The nerves involved were of a pinkish color throughout their substance. All the tissues

* *Bul. New York Acad. Med.*, Vol. II, p. 268.

implicated in the disease were softened, and a remarkable feature was the want of coagulability of the blood. The lungs were engorged, the liver nearly normal, the spleen enormously engorged. The intestines were not ulcerated.

In 1864 the recorded cases became more numerous, and in the following year the disease was observed with comparative frequency in the field hospitals. Surgeon CHARLES M. CLARK, 39th Ill., appears to have been the only medical officer who preserved a full record of his observations. During the first quarter of the year 1865 a number of cases occurred in the 24th Army Corps, and of those treated in the field hospital he made notes of fifteen which are summarized below. *

The country occupied by the troops was high, rolling and heavily timbered, about three miles back from the James River, near Vienna Landing. The season had been remarkably wet, and intermittent, remittent and typho-malarial fevers prevailed extensively. The men had also been continuously exposed to fatigue and excitement.

CASE 33.—Private Samuel Farnsworth, Co. H, 10th N. H., was admitted Dec. 21, 1864, with a coated tongue, dry and burning skin, pulse 120, severe cough, difficult respiration, diarrhœa with involuntary discharges and constant pain in the back of the head and neck. Delirium occurred on the 23d, and he died on the 24th. *Post-mortem* examination: The dura mater was intensely congested; the brain-tissue softened, the ventricles dry; the cerebellum covered with lymph; the membranes of the cord congested in the cervical region. The right lung was hepatized and the lower lobe of the left infiltrated with pus, the pleura on both sides being slightly involved. The heart, liver, spleen and kidneys were normal. The mucous membrane of the intestinal tract was congested throughout and ulcerated in the cæcum and lower part of the rectum, where the congestion was of a dark-mahogany color.

CASE 34.—Private John Hughes, Co. G, 158th N. Y.; age 24; was admitted Dec. 24, 1864, without history. His face was flushed, pupils contracted, pulse 120 and full, skin hot and dry and respiration hurried; he talked incoherently and had a disposition to tonic spasm. He died on the day of admission. *Post-mortem* examination: The membranes of the brain were highly congested; the cerebrum was covered in spots with a yellow exudation and on the left hemisphere, near the longitudinal sinus, the arachnoid was raised by a collection of turbid serum about a half drachm in quantity; each of the lateral ventricles contained a drachm of milky serum; the base of the cerebellum was coated with a pus-like exudation; its substance was pultaceous; the spinal cord was congested throughout but no exudation was apparent. Nothing unusual was discovered in the chest or abdomen except a slight enlargement of the liver.

CASE 35.—Private Arthur Smith, Co. G, 7th Conn.; age 23; was admitted Jan. 6, 1865, having been taken with a chill followed by fever and general pain; he vomited a greenish matter occasionally. No change in the symptoms occurred until shortly before death, when delirium, dilatation of the pupils and tonic spasms were developed. He died comatose on the 22d. *Post-mortem* examination: Body slightly emaciated. The membranes of the brain were distended with serum; its surface was covered with pus and its substance softened, the cerebellum in particular was so soft that a stream of water disorganized it; the ventricles contained no effusion; the spinal cord was congested. The right lung was normal; the left congested, its upper lobe coated with recent lymph. The pericardium contained eight ounces of serum; the heart was normal, the blood in its cavities liquid. The liver was hypertrophied; the gall-bladder distended; the spleen somewhat enlarged; the kidneys normal; the bladder nearly empty. The small intestine was congested and the ileum ulcerated in patches throughout its extent. The colon was healthy.

CASE 36.—Private F. M. Dwyre, Co. C, 9th Me.; age 23; was admitted Jan. 15, 1865, with high fever, pulse 120, dry and brown tongue, jaundiced, dry and harsh skin, injected eyes, contracted pupils, epistaxis and severe pain in the back. Soon after admission he became delirious and so continued until death. For the first three days the catheter was required, and the urine withdrawn had a high color, strong odor and heavy reddish sediment; but after this it became more copious, light-colored and passed naturally. The pupils remained contracted; trismus and dysphagia became manifest. On the fifth day there was some jactitation, and the hearing and vision were very obtuse. He continued with no other noticeable change of symptoms until death on the 24th. *Post-mortem* examination: Body greatly emaciated and jaundiced. The dura mater was intensely congested and the pia mater covered with lymph and pus, especially over the base of the cerebellum, medulla oblongata and optic tract; the cerebrum was softened in places, the cerebellum very soft and almost disorganized: the lateral ventricles were full of bloody serum with pus in the cornua; the membranes of the cord were distended with serum and pus. The right lung was healthy but the left was in process of hepatization, and recent lymph was effused on its pleura. The heart was healthy. The liver was fully one-third larger than normal, its surface mottled and its substance soft and friable; the gall-bladder was empty; the spleen and kidneys normal. The stomach and transverse colon were inflated, the latter measuring fifteen inches in circumference; the vessels of the whole intestinal tract were injected and the mesenteric glands enlarged; three inches of the ileum were intussuscepted at one place and four inches at another; the appendix vermiformis was enlarged and congested; the right colon considerably congested.

CASE 37.—Private G. W. Bean, Co. C, 9th Me.; age 24; was admitted Jan. 16, 1865, with what was considered a well-marked eruption of rubeola together with slight fever, pulse 98, a red and dry tongue, severe pain in the right side, dyspnœa, cough and rusty expectoration. The eruption appeared three days before admission. In the progress of the case complaint was made of severe pain in the head and down the back. Delirium came on and the patient continued insensible until death on the 31st. *Post-mortem* examination: Body greatly emaciated. The membranes

* Surgeon CLARK published his cases in the *Chicago Medical Journal*, January and March, 1867.

of the brain were greatly congested and distended with serum, the arachnoid thickened; the cerebrum and cerebellum were covered with patches of lymph, the optic tract with pus; the brain-tissue was softened, but no effusion was found in the ventricles; the membranes of the cord were infiltrated with serum. The left lung was slightly congested and its bronchial tubes contained pus; the right was hepatized in its upper and in a portion of its lower lobe. The heart was normal. The liver was enlarged one-third and mottled; the gall-bladder nearly empty; the spleen normal; the kidneys slightly congested. The intestines were normal; the mesenteric glands enlarged.

Case 38.—Private Joshua J. Drake, Co. H, 199th Pa.; age 26; was admitted Jan. 18, 1865, with well-marked typhoid symptoms; tongue dry and brown, teeth encrusted with sordes, pulse full and rapid, 120, urine scanty, an occasional cough, marked subsultus and furious delirium. These symptoms continued with an increase of the subsultus and a tendency to opisthotonos, epistaxis, suffusion of the eyes and coma-like stupor, but without change in the pupils. He died on the 22d. *Post-mortem* examination: Body emaciated, abdomen discolored, toes bluish. The dura mater was highly engorged; the pia mater contained serum with lymph especially over the cerebellum, and pus especially over the optic tract; the substance of the brain was softened, but there was no effusion in the ventricles; the membranes of the cord were distended with serum. The upper lobe of the left lung was consolidated and the lower highly congested; pus exuded from sections of the right lung. The pericardium contained eight ounces of serum, with manifestations of the presence of inflammation; the blood in the ventricles was not coagulated, but the right auricle contained an albuminous clot. The liver was enlarged one-third; the gall-bladder enormously distended; the spleen weighed one pound and a half; the kidneys were normal. The intestines were generally healthy, but there was some congestion of the jejunum, and the ileum was contracted fully two-thirds in calibre; the colon was filled with fæces and the bladder distended with urine.

Case 39.—Private David Small, Co. I, 9th Me.; age 16; was admitted Jan. 18, 1865, with a well-marked eruption of rubeola; rapid pulse, 120; hot skin; red and dry tongue; hurried respiration; cough; natural pupils; no delirium but some dulness of intellect. The patient afterwards became delirious and showed a tendency to keep the head thrown back; the pupils were contracted. He died on the 23d. *Post-mortem* examination: Body extremely emaciated. There was arterial and venous congestion of the cerebral membranes, with deposits of lymph and patches of flocculent pus under the arachnoid and around the optic commissure; a quantity of serum, about six drachms, was found in the left lateral ventricle, none in the right; the cerebellum and pons were softened; the membranes of the spinal cord were loaded with serum. The left lung was normal; the lower lobe of the right lung was infiltrated with pus, its posterior surface coated with recent lymph and lying in a small quantity of exuded serum. The pericardium contained four ounces of serum; the heart was atrophied and its substance softened. The liver was one-third larger than normal, its tissues congested; the gall-bladder atrophied, congested and empty; the spleen normal; the kidneys slightly enlarged. The intestines were engorged with blood and there was an intussusception of eight inches of the ileum, the mucous membrane of the containing part being much thickened and congested.

Case 40.—Private James Kirkpatrick, Co. C, 199th Pa., admitted Jan. 20, 1865. Died February 2. *Post-mortem* examination: The dura mater was congested, the arachnoid blackened, and there was considerable effusion beneath them, with a large deposit of lymph over the right cerebral hemisphere and pus over the optic tract; the brain-tissue was soft and ventricles partly filled with turbid serum; the spinal cord was much congested. The upper lobe of the left lung was engorged and adherent; the right lung was bound down by old adhesions. The pericardium contained three ounces of serum; the substance of the heart was flabby and its veins greatly enlarged. The liver was enlarged, the gall-bladder empty, the spleen and the kidneys normal. The peritoneal cavity contained some effusion; the omental vessels were engorged and the intestines congested.

Case 41.—Private H. Manshur, Co. E, 2d N. H., was admitted Feb. 6, 1865, having been sick for two weeks in regimental hospital with chills followed by fever and diarrhœa. On admission he had delirium with contracted pupils, dry and discolored tongue, hurried respiration and pulse 130. In the progress of the case there appeared well-marked trismus and opisthotonos, with rigidity of the abdominal muscles, dilatation of the pupils, involuntary dejections, some petechiæ on the body and a purplish color and coldness of the hands and feet. He died on the 10th. *Post-mortem* examination: The membranes of the brain were puffed out with liquid except the pia mater, which was closely adherent; the convolutions were covered with lymph and in some places with patches of pus; the substance of the cerebrum and cerebellum was softened and each of the lateral ventricles contained a drachm of flaky serum; the spinal membranes were infiltrated with serum. The heart, lungs and kidneys were healthy. The liver and spleen were slightly enlarged; the gall-bladder distended. There was a well-marked appearance of inflammation over the stomach and peritoneum generally; the small intestine was impacted with fæces, the ileum ulcerated throughout its whole extent, the colon distended.

Case 42.—Private James Reynolds, Co. I, 89th N. Y.; age 24; was admitted Feb. 7, 1865. He had been taken sick January 17 with a chill, severe pain in the head, back and extremities and persistent vomiting. About twelve hours after this seizure collapse threatened, but by the free use of stimulants reaction was induced. He had no delirium, convulsions or paralysis, but his head was disposed to be thrown back and there was some dysuria. His hearing was very acute, the least noise disturbing him. The pains gradually left him. On admission he had slight fever, and although very restless in body evinced no derangement of mind; he was not disposed to talk, but answered questions correctly and fully. His eyes were greatly injected, pupils dilated, tongue thickly coated; he did not desire food, but took toast and tea or coffee at the usual hours. His kidneys acted freely and naturally, but his bowels were on several occasions moved involuntarily. He died comatose on the 13th. *Post-mortem* examination: The dura mater was extensively congested; turbid serum was found in large quantity in the membranes and ventricles; the brain-tissue was softened; a thick layer of pus covered the medulla oblongata; pus was found also on the cervical

portion of the spinal cord, the substance of which was softened. The left lung was tubercular, the right healthy. The liver was engorged; the gall-bladder greatly distended; the spleen and kidneys normal. A lumbricoid worm was discovered in the jejunum; the ileum was thinned and congested but not ulcerated; the transverse and descending portions of the colon were contracted.

Case 43.—Private Dennis Brow, Co. M, 4th Mass. Cav.; age 26; was admitted Feb. 19, 1865, suffering from a severe chill, delirium and much dyspnœa. He had been taken sick on the previous day. His tongue was red with a brown centre, eyes suffused, pupils natural, pulse scarcely perceptible, 120–150, respiration short and quick, respiratory murmur clear; he had diarrhœa with involuntary discharges and some abdominal tenderness; he was very restless and indisposed to talk or to answer questions; purpuric spots appeared over the whole surface of the body. Next morning there was an increase of the purpura, and the skin was cold and moist but hyperæsthetic; there was a puffy condition of the face and neck. The patient could retain nothing on his stomach and occasionally vomited a greenish matter; his pupils were dilated. He sank gradually, and died at 2.30 P. M. *Post-mortem* examination: The dura mater presented petechial discolorations over the whole of its upper surface and considerable effusion beneath it; the arachnoid was thickened; the pia mater injected and streaked with purple; bloody serum was found in the lateral ventricles and pus in patches in the cerebral pia mater generally, and over the optic tract, the cerebellum and in the fourth ventricle and spinal canal. The right lung was adherent but healthy. The pericardium presented numerous purple streaks of congestion and contained two ounces of purulent serum; the heart was covered with patches of pus, especially around the aortic sinuses, and its muscular tissue was condensed, cutting like cartilage; the left ventricle contained an ounce of thin bloody serum. The liver was softened and congested in patches both externally and internally, the left lobe presenting a small ulceration; the spleen was one-third larger than usual; the kidneys normal. The intestinal tract was covered with hemorrhagic spots but was otherwise healthy.

Case 44.—Private Benjamin Hyman, Co. F, 11th West Va.; age 20; was admitted Feb. 20, 1865. He was fiercely delirious, constantly changing his position, often breaking into loud exclamations and moans, starting up with a wild expression of countenance and requiring restraint to keep him in bed; his pulse 80, tongue moist and natural, skin dry and cold, hands and feet purplish, pupils slightly contracted, urine scanty and bowels constipated. Soon after admission he vomited a large quantity of greenish matter. Next day petechiæ appeared, mostly on the forearms and legs, but other than this no marked change in the symptoms took place until the 26th, when the pupils became dilated and the delirium subsided in a comatose tendency. He had involuntary passages, trembling of the limbs, opisthotonos, a recurrence of bilious vomiting, dysphagia, deafness and a gradually failing pulse. Just prior to death pustules of acne appeared on the face and neck and a few on the arms and legs. He died March 5th. *Post-mortem* examination: The dura mater was generally injected with both arterial and venous blood; the arachnoid had a shiny opalescent look and was thickened at the vertex on either side of the longitudinal fissure; lymph and pus were found in the pia mater; a thick layer of pus covered the pons Varolii, optic tract and base of the cerebellum; when the brain was placed on the table slight pressure caused the escape of about six ounces of serum from the membranes and ventricles; pus was found in the third and fourth ventricles and in the anterior and posterior horns of the lateral ventricles; the cortical portion of the brain was soft and pultaceous, but the white substance appeared unaltered except by an increase in the number of vascular points; a large quantity of serum and pus flowed from the membranes of the spinal cord. The viscera of the chest and abdomen presented nothing abnormal except that the under surface of the liver had a dark shining look.

Case 45.—Private William Statlen, Co. C, 15th West Va.; age 21; was admitted Feb. 26, 1865, with high fever, restlessness, delirium, contracted pupils, vomiting of small quantities of greenish liquid and petechial spots over the whole surface, most marked on the chest and abdomen. He could not be aroused or made to understand anything; pulse 120. He died comatose at noon of the 28th without presenting any notable change of symptoms in the interval. *Post-mortem* examination: Body not emaciated. The whole cerebral surface, particularly the pons Varolii, was covered with lymph and pus; the brain-tissue was congested and softened and one drachm of bloody serum was found in each lateral ventricle; the membranes of the cord were infiltrated with pus, two ounces of which were collected on section through the cervical region. The lungs were normal. The heart looked anæmic and felt hard and horny; the ventricles contained large, firm and hard albuminous clots which extended into the auricles. The liver was normal; gall-bladder distended; spleen hypertrophied; kidneys normal. The calibre of the ileum was contracted; the mesenteric glands enlarged. The bladder was greatly distended with decomposing urine and its walls inflamed and discolored.

Case 46.—Private F. R. Spillen, Co. H, 199th Pa.; age 26; was admitted Feb. 26, 1865, without history, but with high fever, furred tongue, hot skin, rapid pulse, 120, suffused and watery eyes, hurried respiration and considerable cough. Next day an eruption was noticed over the whole surface of the body, and the patient complained of great pain in the head and soreness in the lungs; afterwards delirium and jactitation supervened, and he died March 1. *Post-mortem* examination: Body emaciated; rigor marked. Great effusion was found beneath the arachnoid, which was thickened; the pia mater was congested and the cerebrum and cerebellum covered with lymph; the brain was much softened but the ventricles contained no serum; the spinal cord was not examined. The lungs were normal. The pericardium contained some effusion, the right cavities of the heart coagulated blood and the left ventricle a large fibrinous clot. The liver was normal; gall-bladder distended; spleen fully two-thirds smaller than usual; kidneys healthy. The peritoneum contained four ounces of liquid; the mesenteric glands were enlarged; the intestines congested and spotted.

Case 47.—Private Emory Wells, Co. D, 39th Ill.; age 25; was admitted at 10 A. M., June 14, 1865, in a comatose condition: Eyes suffused, pupils largely dilated, respiration rapid, pulse 140–150, tongue moist but not furred; he had

a great disposition to tonic spasm, keeping the head thrown back. This man had been apparently in his usual health on the day before admission. He died at 11.30 P. M. *Post-mortem* examination: Body emaciated. The dura mater was greatly injected; there was a large deposition of thick yellowish pus under the visceral arachnoid; the ventricles were filled with turbid bloody serum, and the brain-tissue was congested and softened, a slight stream of water sufficing to wash it away; the medulla oblongata and cervical portion of the cord were infiltrated with pus. The kidneys were fatty. All the other organs appeared healthy.

The records of the field hospitals have preserved only the five cases which follow:

CASE 48.—Private Albert R. Turner, Co. A, 1st Me.; recruit; age 17; was admitted Jan. 1, 1865. He had severe headache and was so stupid as to be unable to tell his name; his pupils were dilated, pulse 100 and full. A blister was applied to the back of the neck and a liniment of chloroform, ammonia and oil to the spine; castor oil with turpentine was given as a cathartic. About midnight the bowels and bladder were moved involuntarily and the patient vomited freely; the stools were very fetid; coma came on, and next morning petechial spots were found thickly and evenly distributed over the entire surface; the pupils were contracted and there was opisthotonos with hyperæsthesia, the least touch inducing spasm. At noon he began moaning, lying unconscious and motionless, the pulse 100 and feeble and the extremities cold. The liniment was continued to the back and extremities; quinine in five-grain doses, with tincture of iron and brandy, was given every four hours. At midnight very fetid matters were vomited. An emetic of sulphate of zinc was given which operated freely, and two hours later twenty grains of calomel produced free evacuations. On the following morning he spoke for the first time since admission, asking for water. The hyperæsthesia and opisthotonos continued, with complete deafness; the tongue was brown and dry but protruded at command; pulse about 90; pupils natural. His condition remained unchanged until the 9th, when he moaned constantly and was very restless, the opisthotonos, general rigidity and hyperæsthesia continuing, the pupils dilated and the petechial spots fading. The quinine was omitted twice, on the 9th and again on the 12th, and on both occasions this was followed by an aggravation of the symptoms; but on renewing and continuing the medicine his improvement was steady. Beef-tea and eggnog were freely given. The rigidity disappeared, the spots faded and the patient regained the use of his arms sufficiently to assist in turning himself in bed. On his transfer to hospital at City Point, Va., February 1, he was much improved and had full use of his arms, but could not stand alone or turn himself in bed without assistance; his pupils were greatly dilated and on attempting to read he found he could not see the letters; he had headache and was entirely deaf; but his appetite was good, bowels regular, pulse 85, mind clear and occupied with what was going on in the ward. [He was moved to Baltimore and thence to Philadelphia, where, on May 10, the McClellan hospital records show him as undergoing sulphur treatment for scabies and taking milk-punch and citrate of iron and quinine for emaciation, impairment of the general health and a small chronic abscess of the right cheek. He was discharged from the service June 23 on account of deafness.]—*Second Division, Sixth Corps Hospital, Army of Potomac.*

CASE 49.—Private Henry C. Tibb, Co. B, 1st Me., muscular and of sound constitution, was admitted Jan. 7, 1865, at 3 P. M., having been taken during the previous night with a severe chill which had not entirely left him at the time of admission. He had intense pain in the head and back, his legs dragged in the effort to walk and he was so giddy that he could scarcely see; pulse 108, quick and full; tongue dry and brown; countenance livid; eyes suffused; pupils normal; petechiæ were scattered over the trunk, and on the lower extremities numerous dark-brown ecchymosed spots varying from the size of a small pea to that of a ten-cent piece and coalescing in many places. A cathartic of castor oil and turpentine was given, bottles of hot water were applied to the feet and stimulating liniments to the surface. At 5 P. M. he was unconscious, restless and moaning constantly. He died at 3 A. M., thirty hours after the attack, in convulsions, without purging or vomiting. The surface of the back, lower part of the abdomen and the lower extremities, except a small part of the anterior aspect of the thighs, were almost black.—*Second Division, Sixth Corps Hospital, Army of Potomac.*

CASE 50.—Private Henry McDowell, Co. C, 21st Pa., complained of headache at 4 P. M. Feb. 16, 1865, and at 11 P. M. had a severe chill, after which dark blotches appeared on the face and extremities. He was admitted at 11 A. M. next day almost pulseless, tongue slightly furred, face somewhat jaundiced, skin of natural temperature but covered with irregular purple blotches; his mind was dull but he was able to answer questions correctly; he was very restless although unable to sit up or even turn himself in bed. Ten grains of quinine were given every four hours and an ounce of whiskey every half hour; warmth was applied to the feet and sinapisms to the spine; carbonate of ammonia was also employed. Coma came on with increasing yellowness of the skin and profuse perspiration; he died at 7 P. M. of the 18th.—*Second Division, Sixth Corps Hospital, Army of Potomac.*

CASE 51.—Martin Gray, unassigned; age 26; was admitted March 16, 1865, with delirium, dilated pupils, involuntary passages, dysphagia, stertorous breathing, opisthotonos, partial paralysis of the lower extremities, acute pain along the spine, a small wiry pulse, 110, and moist skin. Fifteen grains of blue mass were given at once and a half drachm of hyphosulphite of soda every three hours. As his condition was unchanged next day, a fly-blister was applied over the spine and a purgative of croton oil administered. On the 18th the delirium abated and the dysphagia was relieved; the pupils were dilated but not insensible, and although the stools were passed involuntarily the bladder acted naturally. Next day his appetite returned; pulse 90; skin moist; there was no paralysis or involuntary evacuation. The record is defective after this date, giving only notes of treatment, thus: 21st. Gave two ounces of castor oil as an enema. 23d. Gave ten grains of blue mass. 26th. Gave compound cathartic pills. 28th. Gave one grain of calomel and one-fifth of a grain of opium every two hours. 29th. Gave two drops of fluid extract of aconite every two hours. 31st. Died.—*Hospital, Fort Strong, Va.*

CASE 52.—Teamster David Carter, colored; Co. F, Art'y Reserve; admitted Jan. 16, 1865. Diagnosis—typhoid fever. Died 22d. *Post-mortem* examination: The pia mater was injected, the arachnoid thickened and there were yellow patches overlying several parts of the brain, the largest patch at the base; the ventricles contained four or five ounces of serum. The lungs and heart were healthy; the left ventricle contained a large fibrinous clot. The liver, spleen, kidneys, duodenum and jejunum were healthy. The solitary glands in the greater part of the ileum were injected, as also were two of Peyer's patches.—*Field Hospital, Fifth Corps, Army of Potomac.*

In the general hospitals clinical and *post-mortem* notes were made, some of which are herewith submitted:

Cases at the National Hospital, Baltimore, Maryland.

In some of his cases at this hospital Ass't Surgeon GEORGE M. MCGILL, U. S. Army, seemed to doubt whether he had typhus fever or the so-called spotted fever under consideration. Thus, cases 56 and 57 were indexed in his note-book *Spotted fever? Typhus fever?*, and 63 *Typhus?*, while some were recorded in accordance with *post-mortem* observations as *Congestion of the brain, lungs, etc.* Moreover, the suggestion of a contagious quality is made. Among his notes the following occurs: It is my painful duty to say a word in memory of Mr. Caulk, a young gentleman of high promise, a student of medicine at the University of Maryland, who, after assisting us in our examination of the bodies of so-called "spotted fever" cases at the National hospital, himself contracted the disease and died of it.

CASE 53.—*Spotted fever.*—Private Isaac York, Co. A, 13th Ind., was admitted Jan. 14, 1865. The patient had walked to the hospital from the provost marshal's office, and, although his expression was dull, he gave his name and regiment and told how the former was spelled. About noon he became restless and crazy, rolling and tossing in bed, attempting to get up and requiring two men to restrain him. His eyes were somewhat injected; his pupils rather dilated but responsive to light; pulse frequent and full but soft. He did not speak, but appeared to suffer pain in the abdomen and shrank from pressure, especially over the right iliac fossa. The lungs could not be satisfactorily examined on account of his extreme restlessness, but no marked abnormal sounds were heard. Counter-irritation was applied to the back of the neck and a turpentine enema administered. His condition remained unchanged during the night; occasionally he was quiet for a few minutes, but most of the time he rolled from side to side and made violent efforts to get up, to restrain which a sheet was tied across his body to the sides of the bed. Next morning he was more quiet and appeared partially to understand, answering questions with a nod; his tongue was covered with sordes, pulse softer and weaker, pupils natural or a little contracted. Some ecchymoses on his arms, chest and abdomen were ascribed to friction against the restraining sheet; three pints of urine, natural in appearance, were drawn off; deglutition was difficult, but he occasionally took small quantities of liquid. Towards evening he became heavy and comatose, the evacuations involuntary. On the morning of the 16th the breathing was stertorous; a number of dark blotches of different sizes and some small pink spots were found on the chest and abdomen. During the day some contraction of the flexors of the right side was followed by paralysis of that side; he frequently moved the left arm and leg but never the right. He died at 3 A. M. of the 18th. *Post-mortem* examination: The dura mater adhered to the summit of the cerebrum and was somewhat injected; the pia mater was finely injected and its larger veins full of blood; the arachnoid was opaque; the substance of the brain was congested and of a pink color; the lateral ventricles contained liquid and their serous lining was clouded; the veins of the choroid plexus were distended; a liquid looking like pus was found about the right hippocampus major; the lining membrane of the posterior horn of the right side was congested and had its veins enlarged; the third ventricle contained serum; the fourth ventricle was covered with what was considered to be plastic exudation and showed small quantities of puruloid liquid; the pineal body appeared gelatinous and was three times larger than usual. The lower lobe of the left lung was intensely congested,—a portion, one and a half inches square, sank readily in water; the lower lobe of the right lung showed lobular solidification. The heart contained white clots in both ventricles. The liver, spleen and kidneys were congested.

CASE 54.—*Congestion of the brain; Spotted fever.*—Private Orlando Jones, Co. C, 81st Pa.; admitted Feb. 16, 1865. Died next day. He was partially comatose and could give no account of his previous history; but after counter-irritation to the back of the neck he became able to speak and stated that he had been sick only a few days. The pupils were dilated; there was great pallor of countenance, with dulness and rhonchus over the lower part of both lungs, retention of urine and tenderness on pressure in the right iliac fossa. The urine was removed by catheter. *Post-mortem* examination: Body well developed and in good condition; blood liquid throughout the vessels. The veins of the pia mater were quite full; the Pacchionian bodies were numerous on the summit of the hemispheres and resembled recently thrown out fibrin; the brain was firm and somewhat full of blood; the ventricles contained small quantities of serum and the floor of the fourth ventricle was reddened. The lungs were black from melanic deposit; the posterior part of the lower lobe of the left lung was congested by hypostasis, and when cut into showed spots of intense congestion along the tracts of the bronchial tubes of one-eighth inch calibre. The liver was dark in color, firmer than usual, and marked with fibrinous lines along the course of its vessels; the gall-bladder contained black bile; the spleen and pancreas were apparently normal. The jejunum and ileum were somewhat reddened. The kidneys were full of blood; the urine healthy; the suprarenal capsules enlarged and firm.

CASE 55.—*Spotted fever.*—Private William Doty, Co. D, 91st N. Y.; age 27; temperate, but subject to epilepsy; was admitted March 2, 1865, having had a convulsive attack on the previous day. On admission no sign of disease was discovered, but on the 4th he had pyrexia, severe pain in the left side and a faint friction-sound over the lower part of the left lung. A blister was applied and a large dose of Dover's powder given. He complained but little next day and seemed to be doing well, but at night became delirious. On the 6th he was restless, tossing about in bed, and in the absence of restraint getting up and wandering about the ward; pulse rapid and feeble; pupils natural

but insensible; head thrown back by spasm of the muscles. He died early on the 8th. *Post-mortem* examination seven hours after death: Beneath the visceral layer of the arachnoid, which was clear and smooth, was a white fibrin-like substance, most abundant along the course of the larger vessels; a small quantity of serum escaped on opening the lateral ventricles, the lining membranes of which were arborescent from congestion and spotted with small ecchymoses posteriorly and inferiorly, especially on the left side; the cornua contained also about three drachms of pus-like liquid; in the upper part of the left lobe of the cerebellum, one inch within its posterior semicircular border, was a small clot from which bloodvessels radiated irregularly; in symmetrical position on the other side was a similar clot; a third clot, thin and small, was found on the right side of the valley of the cerebellum; the floor of the fourth ventricle was covered with a bluish, tenacious, pus-like substance overlying fine irregular arborescent congestions; a red spot was found in the centre of the cross section of the medulla oblongata. The lower part of the pons, the perforated spaces and their vicinity, especially along the tracts of the vessels, were coated with a bluish fibrinoid substance. The cerebral and cerebellar tissues were congested. The posterior surface of the right lung was uneven and ecchymosed and portions of its upper lobe sank in water; there were interlobar and saccular adhesions of the left lung with subpleural ecchymoses, and at one point intense congestion. The heart contained black and white clots. The liver was large, dark-colored and full of blood; the gall-bladder contained black bile. The spleen, weighing twelve ounces, was light-colored and easily broken up; the kidneys and pancreas were congested. There were regions of intense congestion in the stomach, duodenum and jejunum; the large intestine was slightly reddened. The blood in the vessels was fluid. The urine was highly albuminous. The spinal cord was examined thirty-three hours after death: About a drachm of serous liquid mixed with lymph-flakes escaped on opening the theca; bluish flakes of fibrin were found enveloping the spinal marrow, especially posteriorly; a cross section in the dorsal region revealed much softening, but no other similarly affected spot was discovered.

Case 56.—*Spotted fever? Typhus?*—Culbert Whitcomb, Government employé, was admitted March 8, 1865, with well-marked symptoms of typhoid pneumonia. Cups followed by blisters were freely applied over the surface of the chest. On the 14th the breathing was easy, cough slight, expectoration natural, and a clear sound was heard over all parts of the chest; but on the 16th the patient was seized with delirium and diarrhœa and his tongue became dry and cracked. He died on the 18th. *Post-mortem* examination: Body not much emaciated. The veins of the pia mater were so engorged, especially on the posterior aspect of the cerebral hemispheres, as to present the appearance of a superficial clot; the cerebrum was congested; the lateral ventricles contained a considerable quantity of serum which, in the posterior horn of the left side, was tinged with blood; the floor of the fourth ventricle was discolored at its extremities and crossed above the origin of the auditory nerve by a white zone presenting four lines of marked congestion; the substance of the cerebellum was apparently softer than that of the cerebrum. The right lung was congested posteriorly and seemed ecchymosed in its substance and superficially under the pleura; the left was carnified posteriorly. The right cavities of the heart contained white inelastic clots; the cardiac walls were flaccid and of a dark-red color, looking as if they had been bruised; the lining membrane of the aorta was of a dark-scarlet color. The liver was dark-colored and friable; the bile very black; the spleen small, tough and dark-colored; the kidneys flaccid, tinted red and not distinctly marked on section into tubular and cortical portions; the sac of the right suprarenal capsule was distended with a granular bloody liquid; the pancreas was reddened. The stomach presented a large submucous ecchymosis at the fundus; the small intestine was intensely congested, with Peyer's patches well developed and the solitary glands enlarged; the large intestine was similarly congested and presented a few round and irregularly oval ulcers. No albumen was found in the urine. The blood generally was liquid.

Case 57.—*Spotted fever? Typhus?*—Corp'l Frederick Bossardo, Co. I, 24th Mich.; age 20; was admitted March 11, 1865, in a state of partial coma with tremor. He could be aroused to take nourishment and stimulants, but quickly relapsed into stupor. He had involuntary evacuations and at times violent spasms of the extensor muscles. Deep pressure in the right iliac fossa appeared to cause pain. The stupor and spasms continued until death on the 17th. *Post-mortem* examination: Body greatly emaciated. The Pacchionian bodies were well developed; the arachnoid contained limpid serum; the substance of the brain was firm; the lateral ventricles contained a small quantity of serum and their lining membrane was opaque; the floor of the fourth ventricle was white but marked by arborescent congestions above the origin of the auditory nerves; the substance of the cerebellum was softer than that of the cerebrum. The right lung, twenty-eight ounces, was full of blood, and under the pleura on the posterior portion of its lower lobe were two ecchymosed spots; the left lung, twenty-six ounces, was partially solidified posteriorly and had an ecchymosed appearance. Both ventricles contained clots, white in the left but mixed in the right. The liver was light-colored, friable and odorous: the spleen enlarged to twelve ounces, dark-colored and easily broken down; the pancreas reddened; the kidneys congested; the suprarenal capsules healthy. The stomach was enlarged and mottled internally; the jejunum yellow and ecchymosed; the small intestine thinned generally and Peyer's patches conspicuous; the large intestine discolored and the colic glands enlarged and blackened.

Case 58.—*Spotted fever.*—Private Aaron James Brown, Co. I, 52d Ohio; age 32; admitted March 11, 1865. The body of the patient exhaled an ammoniacal odor; its surface was of the ordinary temperature but very dry and covered with dark mulberry-colored spots irregularly circular in form, about the size of a split-pea, but not elevated and not disappearing entirely on pressure; the tongue was stiff and, like the teeth, coated with dark incrustations; the pupils were at first responsive to light but afterwards became insensible. He had delirium, which increased and was accompanied with muscular spasms, drawing the head strongly backward. He died on the 21st. *Post-mortem* examination: Body not much emaciated; skin measled with dark-colored and apparently fading spots. There was no serum in the sac of the arachnoid, but the veins of the pia mater were full, and this membrane was detached with difficulty from the convolutions; there were numerous puncta on the cut surface of the brain, which also was somewhat reddened;

bloody serum was found in the posterior horn of the left lateral ventricle—but very little in the anterior horn; the floor of the fourth ventricle was opaque and the roots of the auditory nerves indistinct; the medulla oblongata was somewhat congested. The right lung was adherent on its posterior aspect; its lower lobe presented several subpleural apoplectic spots posteriorly; some mottling was observed over the exterior face of the whole lung; though full of blood the organ was not thought to be congested. The left lung was also full of blood but not congested except in the posterior part of the lower lobe, where the outlines of the lobules were well defined and their substance on section presented light-red polyhedral spots in a matrix of effused blood; a portion of this tissue sank in water, and when broken up by the finger yielded a bloody pulp. The heart was free from clots. The liver presented oval discolorations on its upper surface; its substance was finely congested, especially in the regions indicated by the congested superficial patches; the upper surface also showed irregular light-colored mottlings, which were shown by section to extend into the subjacent tissue; the gall-bladder contained black bile. The spleen was normal; the kidneys slightly congested; the suprarenal capsules reddened; the pancreas enlarged, light colored and friable. Dark ecchymosed spots were found under the mucous membrane of the stomach. The upper part of the jejunum was reddened; congestion in the small intestine seemed to have a tendency to determine itself in spots of irregular form, with a diameter not generally larger than one-fourth of an inch; Peyer's patches appeared healthly. The lower part of the large intestine was congested. Albumen was found in large quantity in the urine. The blood was generally fluid.

Case 59.—*Congestion of the brain and lungs.*—Corp'l Jacob Crow, Co. I, 20th Ohio; age 32; was admitted March 11, 1865, with symptoms of incipient typhoid fever. While apparently improving, on April 1, he was seized with erysipelas of the face. On the subsidence of the inflammation he became delirious and was restrained with difficulty; opisthotonos came on, and he died on the 10th. *Post-mortem* examination: Lateral ventricles each containing an ounce of serum; pia mater, fourth ventricle, pons and medulla congested. Lungs congested, with some solidification and emphysema of the lobules; bronchial tubes congested and containing purulent fluid. Heart filled with mixed clots. Spleen large and pulpy; kidneys congested. Ileum hyperæmic and presenting the shaven-beard appearance.

Case 60.—*Congestion of lungs and brain.*—Corp'l Jacob Brubaker, Co. B, 12th U. S. Inf.; age 21; admitted March 17, 1865, after three or four weeks sickness. On admission there was fever with a coated, dry and tremulous tongue, twitching of the mouth and some hesitation in articulation; slight cough was also present, with resonance and sibilant and sonorous râles over the posterior aspect of the chest. The nervous symptoms became more marked, the patient rolling restlessly from side to side, and a slight purpuric rash was observed over the abdomen and chest, not elevated and not disappearing under pressure. He died comatose April 7. *Post-mortem* examination: Pia mater injected; arachnoid opaque; ventricles containing serum. Lungs generally congested, with lobular consolidation and emphysema in the posterior portions; bronchial tubes reddened and containing much tenacious bloody mucus. Spleen large. Intestine hyperæmic; Peyer's patches conspicuous and marked with black points.

Case 61.—*Cerebro-spinal meningitis.*—Private Robert Minchion, Co. D, 2d Mass.; age 18; was admitted March 18, 1865, with symptoms of nervous disturbance, and on the lower extremities from the hips downward a peculiar eruption, consisting of a red areola varying from the size of a five-cent piece to that of a half-dollar, enclosing a dark centre in a state of incipient sloughing. The tongue was dry and coated with a dark-yellow crust; the abdomen but slightly tender; the evacuations regular. The patient complained much of the fatigue of travel and of hardships endured on Galloupe's Island, Boston Harbor, stating that inferior food and scarcity of water were the causes of his present condition of prostration and filth. He was rational but slightly deaf. About a week after admission an eruption resembling that produced by croton oil appeared on the left cheek and neck, and as this in the course of two days became somewhat umbilicated the patient was isolated. The central portions of the spots on the legs had in the meantime gradually sloughed, and incoherence, delirium, dimness of vision, contraction of the pupils, suffusion of the conjunctivæ, with increasing opisthotonos and ultimately partial coma had supervened. The comatose condition lasted until twenty-four hours before death, when he became wild and almost uncontrollable; this was followed by great muscular prostration from which he did not rally. Death took place April 12. *Post-mortem* examination: Body emaciated, rigid and marked by ulcerations, especially on the lower extremities and left side of the face and neck. The sac of the arachnoid contained a small quantity of liquid in which, especially on the right side, flakes of lymph were floating; lymph-flakes were also loosely or closely attached to the perforated spaces, optic commissure, left fissure of Sylvius, anterior portion of the pons and to the arachnoid stretching over the valley of the cerebellum; the pia mater was finely congested; puncta were numerous on the cut surface of the cerebrum; the right lateral ventricle, the lining membrane of which was highly congested, contained half an ounce of amber-colored flocculent liquid, with flakes of lymph in the cornua and on the choroid plexus; the left ventricle presented less liquid, more flocculi and more intense congestion of its lining; the third ventricle was filled with a similar liquid, the flocculi of which had lodged chiefly in the infundibulum; the pineal body was large; the fornix and lower part of the corpus callosum were greatly softened, the former being of the consistence of thick cream; the floor of the fourth ventricle was discolored generally and presented small blood-spots, seven on the left side and two on the right in the situation of the lineæ transversæ. The sac of the spinal arachnoid contained serum, and a mass of lymph was attached to its visceral surface; the pia mater was congested; the cord was softened and broken in the middle of the dorsal region,—the break may have been made by accident in opening the canal, but the softening was observed opposite the first lumbar vertebra. The bronchial tubes in both lungs were congested; the left lung was collapsed in some parts but was otherwise normal; the right was hepatized, red in its posterior and upper part and gray in its posterior and lower part. The heart contained fibrinous clots in all its cavities. The liver was normal; the spleen large and firm; the pancreas, kidneys and suprarenal capsules normal. The stomach was congested; the ileum thinned; Peyer's patches well marked but not hyperæmic; the large intestine congested in parts.

CASE 62.—*Spotted fever?*—Lt. Col. Gustavus Helmrich, 40th Mo.; a paroled prisoner; age 48; stout and muscular; was admitted March 24, 1865, with nervous symptoms, chiefly manifested by twitching of the corners of the mouth, jerking of the limbs, especially when touched, tremor of the tongue and imperfect speech. He seemed to understand questions partially, especially when put in German, but his answers were incoherent. He tried to write his name but his hand was too tremulous; when half through an attempt to spell it he lost the connection and turned impatiently away. His pulse was soft and feeble; conjunctivæ injected and pupils contracted. There was a diffused purpuric rash on the chest, abdomen and arms. He shrank from pressure over the epigastrium and over the abdomen generally. He stated that he had vomited and that his bowels had not been moved for three days. The respiratory murmur was slightly diminished over the posterior parts of the chest and the breathing was somewhat bronchial under the left scapula. Coma supervened during the night following admission, and he died at 6 A. M. next day. *Post-mortem* examination: Body well developed. The pia mater adhered to the cerebral convolutions and at the base of the brain was finely and generally congested; a large quantity of serum was found under the visceral arachnoid, and two ounces tinged with blood were taken from under the tentorium after the removal of the brain. The cerebral substance was firm and showed many puncta on section; the lateral ventricles contained a small quantity of serum; the large veins of the corpora striata near the foramen of Monro and those of the velum interpositum were covered with an opaque translucent membrane; the fornix had many puncta at its union with the corpus callosum posteriorly; the third ventricle contained serum; the pia mater covering the valve of Vieussens was intensely but delicately congested; the floor of the fourth ventricle was generally reddened, with arborescences in the upper part, a scarlet point of extravasation on each side above the lineæ transversæ and more discoloration than usual near the point of the calamus; the pons Varolii was congested. The right lung was engorged; the lower lobe of the left lung, on section, exuded a bloody liquid and had adhesions on its outer face and some subpleural dark spots on its posterior aspect. The right ventricle of the heart contained a small white clot; the right auricle and left ventricle had each a soft mixed clot. The liver was firm, heavy, smooth on section, reddish-brown, with indistinct acini; a small calcareous mass, surrounded by a star-shaped contraction of the capsule, was found in the middle of the upper part of the right lobe; the bile was thick, black and granulated. The spleen, eighteen ounces, was much engorged and decidedly softened, its capsule thickened. The kidneys were somewhat large and congested in their tubular portions; the pancreas, enlarged and congested, contained a large calcareous mass. The mucous membrane of the stomach was not apparently softened, but was of a dark ash-red color generally and cherry-red at the fundus; the small intestine presented in certain regions a somewhat ironed appearance; the upper part of the jejunum was darkly discolored; Peyer's patches were distinct, hard to the feel and black pointed; the mucous folds of the ileum were blackened. The cæcum and colon were hyperæmic and their mucous coats blackened.

CASE 63.—*Typhus?*—Private John Bramon, Co. D, 16th Iowa; age 42; was admitted Nov. 28, 1864, as debilitated by recurrences of intermittent fever. About a week after admission the fever manifested itself, returning at regular intervals until subdued by quinia and alteratives. The patient so far recovered as to be able to do light duty and enjoyed apparently good health until April 1, 1865, when he was seized with fever and cough with light rust-colored expectoration. Under treatment the pneumonia disappeared, the patient became able to sit up and his appetite returned; but on the 10th he was seized with great lassitude, anorexia and sleeplessness; the excretions became scanty, the tongue dry and dark and the abdomen somewhat tender. Next day a diffused reddish papular eruption appeared over the entire body. The patient continued rational, complaining only of excessive weakness until the 14th, when it was found difficult to obtain replies from him; a peculiar odor emanated from the body; the urine contained no albumen; the bowels had been opened by cathartics and enemata. On the 15th the surface was mottled and cold; the face dusky; eyes suffused; pupils contracted and feebly responsive to light; tongue covered with soft dark sordes and protruded with difficulty; impulse of the heart weak. There was no opisthotonos throughout the case. He died on the 16th. *Post-mortem* examination: Body rigid; its surface marked by a confluence of discolored spots of different sizes. The sac of the arachnoid contained about an ounce of serum; the pia mater was finely injected. On the vertex of each hemisphere was an ecchymosed spot about the size of a cent; the cerebral substance was generally but slightly congested; the lateral ventricles contained a small quantity of serum; a single central line of congestion was found on the floor of the fourth ventricle above the region of the auditory nerves. Both lungs were adherent, collapsed, flaccid, but so injected posteriorly as to seem ecchymosed. The heart contained clots. The liver was congested and of high specific gravity; the bile dark-brown; the spleen eleven ounces, softened; the pancreas and kidneys normal. The mucous membrane of the stomach was congested at the fundus and along the lower curvature. The duodenum was congested and had the ironed-out appearance; the adjoining parts of the jejunum and ileum were stained with bile; the ileum was congested in parts; Peyer's patches were conspicuously marked with black spots. The ascending colon was hyperæmic.

CASE 64.—*Spotted fever.*—Private Samuel I. Hargrave, Co. K, 152d Ind.; age 19; was admitted delirious Aug. 11, 1865. His previous history was unknown, but it was understood that he had been sick about ten days. His pulse was rapid and thready, tongue dry and brown, pupils slightly contracted, bowels constipated, bladder distended, right iliac region tender. The head was extremely extended and there were marks of recent vesication on the back of the neck. No eruption was observed on any part of the body. The bladder was relieved by catheter and the bowels by enemata; a half-grain of morphia procured several hours of quiet sleep; five grains each of quinine and chlorate of potash were given every four or six hours, with beef-essence, eggs and milk-punch; cold was applied to the head and blisters between the shoulders. The patient, when not under the influence of anodynes, was extremely restless, tossing about in bed and getting up when not closely watched: occasionally he seemed rational, but replied incoherently when addressed. The opisthotonos continued until death. The urine, drawn off twice daily, was frequently tested and found to be normal. On the 19th his tongue became swollen and deglutition difficult. He died on the 21st.

Post-mortem examination: Body much emaciated and slightly rigid. Under the arachnoid, covering the valley of the cerebellum, the cysts cysticerki, perforated spaces, fissures of sylvius and upper surface of the cerebrum were these deposits of lymph: the pia mater was intensely and universally congested: a sac about the size of a pea, containing lymph and pus, was found in the right plexus of the third ventricle, flakes of lymph in the middle horn of the left lateral ventricle and the soft adhesions on the floor of the fourth ventricle: the substance of the brain presented numerous points but was not apparently altered in consistence. A grayish liquid flowed from the sac of the spinal arachnoid when it was accidentally cut in the lumbar region: a large quantity of lymph, one to three lines in thickness, was found under pia mater and layer, especially at the lower part of the cord: the pia mater was intensely congested; the substance of the cord was not softened. The lungs were congested and ecchymosed posteriorly. The heart was firm and of a deep red color,—a large yellowish clot on each side. The liver was dark-colored, mottled superficially with yellowish-white, firm, full of blood and strongly adherent: the gall-bladder contained black fluid bile: the spleen was normal: the kidneys small and somewhat yellow, congested in their dependent portions. The stomach, near the pylorus, was congested. The small intestine was hypersemic, dark-red at the lower end: the solitary glands were enlarged and Peyer's patches well developed. The colon was somewhat injected.

Cases at the Hospitals of Alexandria, Va.

Case 65.—Private George Rice, Co. B. 10th Vt.; age 30: admitted Jan. 12, 1864. Diagnosis—acute rheumatism. On the 14th he was seized with opisthotonos. Counter-irritants along the spine gave but little relief. He died on the 17th. *Post-mortem* examination: The pia mater was congested and there was exudation of lymph along the spinal cord. The lungs were congested.

Case 66.—Private William Hitchen, Co. B. 1st N. J. Cav.: age 25: was admitted Jan. 26, 1864, as a case of quotidian intermittent. The fever was arrested by quinine, but on the 29th the patient was seized with pain in the loins, headache, some delirium and paralysis of the right arm and leg, while his tongue became dry and his pulse frequent. Cups and blisters were applied to the back of the neck, after which he became quieter and alternately comatose, in which condition he remained until death, February 1. *Post-mortem* examination: The brain was congested; pus was found on the cerebro-spinal membranes. The lungs were congested and part of the left lung hepatized.

Case 67.—Private John K. Jones, 1st Me. Cav.: age 18: was admitted March 8, 1864, with what was supposed to be congestive intermittent fever, but in a few days symptoms of cerebro-spinal meningitis were manifested. The patient died comatose on the 15th. He was treated with calomel, saline cathartics, quinine freely administered and enemata of colocynth. *Post-mortem* examination: Extensive inflammation of the membranes of the brain and spinal cord, extending as far as the middle of the dorsal region: large lymph-deposits on the arachnoid: the ventricles of the brain were unusually dry.

Case 68.—Private C. R. Spencer, Co. B, 107th N. Y.: age 23: admitted Nov. 2, 1864. Died 5th. *Post-mortem* examination: No emaciation; marked rigor mortis; extensive suggillation posteriorly and on abdomen. The arachnoidal surfaces along the longitudinal fissure were adherent: the pia mater was congested: there were purulent deposits by the sides of the large veins in the subarachnoid space and at the base of the brain, covering and in some places fluctuating on the under surface of the pons, cerebellum and medulla oblongata, the roots of the cerebral nerves and the spinal cord. The lungs were healthy. The heart was distended with dark unclotted blood. The spleen was enlarged and the intestines somewhat meteorized, but otherwise the abdominal viscera were healthy.

Case 69.—Private Marshall Stowell, Co. E. 189th N. Y.: age 16: was admitted Nov. 30, 1864, with typhoid fever. He was restless and noisy, his face flushed, eyes suffused, tongue dry, swollen and with the papillæ much enlarged in the middle and at the base, mouth and throat dry and sore, teeth and lips covered with sordes, pulse frequent and irregular, skin hot and dry: but there was no diarrhœa. He was treated with cold to the head, sinapisms to the feet and abdomen, hyoscyamus, brandy-punch, beef-tea and a few doses of turpentine and chlorate of potash. On December 16, having been alternately restless and quiet in the meantime, he was seized with pain in the head, much abdominal tenderness and vomiting, morning and evening, of a thick brownish liquid. The tenderness increased and the patient became very comatose—pulse 130—until the 18th, when there was less pain, some appetite and a better pulse, 100. But on the 19th he became somewhat comatose. As there had been no stool for a week oil of turpentine was given with the effect of producing a full natural evacuation: but the coma gradually increased with quickened and labored breathing, and he died December 20. *Post-mortem* examination: Body emaciated; face pale; surface showing a little stasis but no petechiæ or spots. The surface of the brain was congested and covered with patches of opaque green lymph; the lateral, middle and fourth ventricles were filled with serum and sticky pus; the substance of the brain was not softened. The posterior and lower portion of the right lung was mostly emphatic but of a dark-red color, and its smaller tubes contained muco-pus: the posterior and upper part of the left lung was dark-red and softened but crepitant. The right side of the heart was distended with a firm white clot and with thick but fluid black blood. The liver was pale and had yellowish spots extending from its surface into its substance; the spleen, about the size of the fist, was firm and of a light red-brown color. The kidneys were fatty and granular; the bladder distended, reaching to within three inches of the umbilicus. The mesenteric glands were enlarged. The brain was congested on its posterior side but not ulcerated. The colon contained a moderate quantity of feces of normal appearance and presented coal dark spots of a bluish tinge on the mucous membrane from the transverse colon to the rectum. [Specimen 528, Med. Sect., Army Medical Museum, shows part of the left lateral ventricle, the choroid plexus, roughened by pseudo-membrane, with shreds of lymph hanging from various parts of the ventricular lining.]

Case 70.—Private Sylvester Slow, Co. K. 20th Mass.; age 24; was admitted Dec. 28, 1864, having walked from the Wood-ward street prison. He complained of pain in the joints and boasted that there was nothing else the matter with him: his tongue was somewhat brown in the centre, but the edges were clean, and moist: skin dry and

cool; eyes natural; bowels moved during the previous night; breathing somewhat hurried; slight dulness over both lungs; no headache. During the night he had a fit lasting but a short time, after which he became delirious, muttering incoherently, and affected at the same time with a short harassing cough accompanied with frothy, bloody expectoration. He died at 11 A. M. of the 29th. *Post-mortem* examination: Yellow exudation at the base of the brain and between the cerebrum and cerebellum; some slightly turbid serum in the lateral ventricles; a pigment deposit the size of a pea in the lower part of the right optic thalamus, presumed to be the result of a former extravasation of blood; slight hardening of the brain-substance. Some lobular pneumonia; cirrhosis of the liver; enlargement of the spleen; inflammation of the solitary follicles of the ileum and cæcum.

CASE 71.—Private John Fitzpatrick, Co. G, 28th Mich.; age 37; admitted Jan. 26, 1865. Diagnosis—acute bronchitis. Died February 2. *Post-mortem* examination: No emaciation; marked rigor mortis; much suggillation posteriorly. The longitudinal sinus was filled with dark clotted blood; the dura mater was normal but the pia mater was covered with unorganized lymph; the brain was healthy, with two drachms of serum in its ventricles; the spinal cord was not examined. The mucous membrane of the trachea and bronchi were inflamed, thickened and roughened; the bronchial glands enlarged and very dark. The lungs were somewhat emphysematous in their upper and congested in their lower lobes. The heart was enlarged and showed large numbers of fat-globules under the microscope; the pericardium was normal. The omentum was congested; the liver enlarged and very pale; the intestines normal except for a softening of the mucous membrane of the ileum; the mesenteric glands enlarged and dark; the remaining abdominal viscera normal.

CASE 72.—Private William E. Tappan, Co. H, 28th Mich.; age 17; admitted Jan. 31, 1865. Skin hot and dry; tongue dry and somewhat fissured, red at the edges and coated dark yellow in the middle; pulse quick and feeble; bowels rather loose; urine scanty and high-colored; respiration somewhat hurried; he was rational and complained of pain in the back of the head and neck. He did not rest well during the following night, and next day, although his tongue was less dry, his pulse was fuller and the pain more intense, extending from the head down the spine and over the body generally; he was peevish, fretful and slightly delirious at times, though he answered questions correctly. A blister was applied to the back of the neck and alteratives administered. On February 2 delirium was constant; the patient muttered, tried to get up, and had occasional attacks of opisthotonos which increased in violence, but there was no paralysis; he refused all food. Wet cups were applied along the spine. Next day opisthotonos was less marked, but delirium continued with dilated pupils; the catheter was required to relieve the bladder. On the 4th the pulse became weak and intermitting; the respiration labored and accompanied with a rattling in the throat; he was semi-comatose but easily aroused; the tetanic convulsions returned with violence, and he died at 11 P. M. *Post-mortem* examination: Body not emaciated. The veins of the cerebral membranes were distended with black blood; the brain was firm and slightly injected; its lateral ventricles contained thick pus and their veins were black and engorged; the velum interpositum, valve of Vieussens and the membranes from the optic commissure down the medulla as far as could be seen were covered with lymph and pus; the gray matter of the cerebellum was so pale as to be scarcely distinguishable from the white matter; the cerebellum and spinal cord were softened. The upper and lower lobes of the right lung were somewhat congested and showed dark-purple or blackish patches of softened tissue; the middle lobe was œdematous, of a gray color tinged with pink, and presented at its margin a patch of shrunken liver-red tissue full of enlarged bronchial tubes containing pus; the left lung was similarly affected but in a less degree. The heart was normal. The liver was somewhat enlarged, yellow and granular; the spleen small, its trabeculæ and Malpighian bodies enlarged, dry and bloodless; the intestines and kidneys normal; the bladder largely distended and the overlying recti muscles of a bright-red color.

CASE 73.—Private Nicholas V. Sharp, Co. A, 25th Wis.; age 36; admitted Feb. 9, 1865, from Washington street prison. Diagnosis—typhoid fever. The only symptoms on the record are: Dark-purple spots covering the body; tongue slightly coated; pulse 130, weak; some frontal headache; bowels loose. He died during the day. *Post-mortem* examination: Lymph was effused at the base of the brain and between the cerebrum and cerebellum; there was also engorgement of the cerebral veins and serous effusion in the ventricles. The pericardial sac contained effused serum. Part of the upper lobe of the left lung was inflamed and softened. The liver was large, fatty, soft and granular; the spleen large, soft and discolored; the small intestine normal; the colon slightly inflamed.

CASE 74.—Private Jacob Evans, Co. E, 1st Del., was admitted Feb. 14, 1865, unconscious and in a condition of low delirium. In a few days opisthotonos came on, and he died on the 24th. Stimulating liniments and sinapisms were applied to the spine and extremities, while the head was kept cool. *Post-mortem* examination: The membranes of the brain were injected; lymph and pus were deposited from the medulla upwards to near the optic commissure; the brain-substance was cream-colored and softened; the lateral ventricles were filled with pus and serum, the choroid plexus of each opaque and pale and the wall of the posterior cornu softened; the third ventricle was distended with serum, the fourth with serum and pus. The spinal membranes were unaffected. The lower lobe of the right lung was dark-brown, soft, non-crepitant and heavier than water; the left lung was softened, its bronchial tubes injected. There was a slight effusion in the pericardial sac. The walls of the stomach were soft and white; the liver light-colored and cirrhosed; the spleen anæmic; the portal veins full; the colon distended with flatus.

CASE 75.—Private James O'Leary, U. S. Inf., unattached; admitted Feb. 23, 1865, from Washington street prison so nearly moribund that no history could be obtained from him. His eyes were fixed and vacant, skin cold, dry and livid. He died soon after admission. *Post-mortem* examination: The meningeal vessels were pale and watery, as were those of the vascular processes in the lateral ventricles; serum was effused beneath the arachnoid and lymph at the vertex and over the base of the brain; the cerebral substance was pale, soft and anæmic, and the ventricles contained

serum with some lymph. The spinal cord was soft. The glands at the root of each lung contained calcareous deposits. The liver was large; the spleen soft and pulpy; the bladder largely distended.

Case 76.—Serg't William R. Brock, Co. F, 6th Tenn.,* age 34; was admitted Feb. 17, 1865, with pneumonia. He improved steadily until March 6, when he was attacked with cerebro-spinal meningitis, for which he was blistered on the neck and spine and treated with veratrum viride and saline cathartics. He died on the 8th. *Post-mortem* examination: The pia mater was congested; there was a large quantity of purulent liquid beneath the arachnoid, one ounce of yellowish serum in the ventricles and two ounces at the base of the brain; the cerebral substance was normal but the cerebellum was softened. The membranes of the spinal cord were thickened and the subarachnoid space filled with purulent liquid. The middle part of each lung was hepatized.

Case 77.—Private John McClure, 2d U. S. Cav., was admitted April 8, 1865, in an unconscious state. He writhed incessantly; his pulse was slow and labored; his eyes fixed and staring and his pupils dilated. He had no convulsions, but died comatose on the 11th. *Post-mortem* examination: Serum and yellow lymph were found beneath the arachnoid, especially on the right side, and also between the optic tracts and crura cerebri; the substance of the brain was normal, but the choroid plexus on each side was darkly congested and somewhat thickened or opaque on its anterior margin. The right lung was pale, bloodless and solidified in the posterior parts of its upper and middle lobes and deeply congested in its lower lobe; the left lung was congested. The heart was large and slightly fatty: some old opacities were found on the anterior surface of the right ventricle. The liver was pale, the spleen small and hard; the lower ileum natural.

Cases at various General Hospitals.

Case 78.—Lieut. R. D. Edwards (rebel) was admitted Feb. 1, 1864, in a condition of low delirium from which he could be aroused to answer questions rationally: Thirst; constipation; pulse strong, 115; deafness; eyelids purple and swollen and pupils sluggish; severe pain in the forehead and left side of the face; pain and stiffness of the muscles of the back of the neck and back, with tenderness over the last cervical and first dorsal vertebræ; sensation somewhat lessened and motion greatly impaired in the left arm and leg. The delirium increased and with it the paralysis, which extended to the other side. For four days before death he was in an almost helpless condition, drowsy and stupid, complaining only when moved. He died on the 7th. *Post-mortem* examination: Rigor not well marked; considerable suggillation posteriorly; some reddish spots on the limbs. An ounce of reddish serum was found at the base of the brain and a quantity of exudation, diffluent and pus-like, around the left lobe of the cerebellum and adhering to the tentorium; the veins of the pia mater were filled with blood; the membranes were easily detached from the convolutions, and a thin semitransparent exudation covered the surface of both hemispheres; the puncta vasculosa were numerous and the lateral ventricles filled with liquid, but the vessels of the choroid plexus were not injected; the pineal gland was broken down into a thin yellowish liquid adhering to the velum interpositum, and there was some exudation about the optic commissure. Bloody serum, amounting to five and a half ounces, was found in the spinal canal, with some blood-clot and an exudation of a membranous form extending from the last cervical to the tenth dorsal vertebra; the cord, which was bathed in a yellowish creamy fluid, was soft and semifluid at the points where the false membrane terminated; the gray substance was scarcely distinguishable from the white. Both ventricles of the heart contained fibrinous clots; blood, partly coagulated, flowed from the great vessels. The lower lobe of the right lung sank in water and the upper lobe was saturated with reddish serum; the lower lobe of the left lung was dark-blue posteriorly and condensed in patches. The liver was soft, greasy and of the nutmeg appearance; the gall-bladder contained half an ounce of reddish-brown bile; the spleen, five ounces and a half, was bluish-green anteriorly, reddish posteriorly, its substance diffluent and the Malpighian bodies enlarged and distinct; the kidneys were healthy. The mucous membrane of the stomach was softened in several places, especially about the cardiac orifice. The intestinal walls were thin; the ileum in part colored blue, its epithelial layer softened in oblong patches and its solitary follicles visible. The large intestine was healthy but the open mouths of the solitary glands appeared quite distinct.—*Ass't Surg. Roberts Bartholow, U. S. A., Hospital, Chattanooga, Tenn.**

Case 79.—Andrew Galespy, Government employé, admitted Feb. 1, 1864. Diagnosis—pneumonia. Died 4th. *Post-mortem* examination: The vessels of the brain were much engorged; serum was effused under the arachnoid and lymph around the choroid vessels and at the base of the brain over the optic commissure; the lateral ventricles contained each two drachms of serum. The lungs were much congested. The heart contained large buff-colored clots. The liver and kidneys were fatty; the stomach, spleen and intestines healthy.—*Hospital No. 1, Nashville, Tenn.*

Case 80.—Private James Draper, 9th Ohio Batt'y, was admitted Feb. 10, 1864, with laryngitis. He had regained his strength and was about to rejoin his command when he was suddenly attacked with active delirium, during which his pulse was 160, tongue dry and red and eyes suffused. These symptoms lasted forty-eight hours, after which he became comatose, and died March 21. *Post-mortem* examination: The Pacchionian bodies were enlarged and appeared to be ulcerated; the cerebro-spinal membranes, as far as the fifth cervical vertebra, were congested and contained four ounces of clear serum; the cerebral vessels were injected, the convolutions covered with lymph and the floor of the ventricles with fibrinous deposits. No other organs were examined.—*Hospital, Tullahoma, Tenn.*

Case 81.—Private Robert Carr, Co. G, 1st Mo. Eng'rs; age 15: was admitted March 2, 1864, with meningitis. He died on the 6th. *Post-mortem* examination: There were heavy deposits of lymph on the surface of the brain but its substance was healthy. The lower lobe of the left lung was hepatized. The right cavities of the heart contained large yellowish clots and there were smaller clots in the left side; the endocardium in the left auricle was roughened. The abdominal viscera were healthy.—*Hospital No. 1, Nashville, Tenn.*

* Dr. Bartholow published this case in the *Cincinnati Lancet and Observer*, July, 1864.

CASE 82.—Private George W. Bassinger, Co. F, 12th Mo. Cav., was admitted March 19, 1864, having had a chill on the previous day. He complained of pain between the shoulders, which increased in severity until the 21st, when he was taken with a congestive chill or collapse and became insensible. The muscles of the back and neck contracted spasmodically; the surface was cold, the pulse small, frequent and thread-like, digestion difficult and the discharges involuntary. After three days the pulse became fuller and slower, the surface warm and consciousness returned, the patient complaining of pain in the head and back and of extreme sensitiveness of the surface. From this time he had fever of a typho-malarial type, which lasted three weeks without any material change except a gradual improvement. On the date of the report, April 20, he was considered convalescent. He had weakness of the back and symptoms of paralysis of the lower extremities, but not such as to prevent him from walking about the wards.—*Surgeon Ira Russell, U. S. Vols., Benton Barracks, Mo.**

CASE 83.—Private Alfred Lockwood, 41st Ohio, was admitted from the military prison March 25, 1864, in a semi-comatose condition, with the head drawn back, rigidity of the muscles of the neck and tenderness on pressure over the cervical vertebræ. The eyes were injected, pupils dilated and fixed, pulse 90, soft and full, tongue furred yellowish-white and abdomen slightly tympanitic. When roused and questioned he always gave the same answer, and when placed upon his feet he staggered like a drunken man. Six cups were used on the temples and nape of the neck for the extraction of eight ounces of blood and cold cloths thereafter applied to the head; at the same time croton oil was administered, which operated feebly. After this the patient seemed improved; he had better command of his faculties when his attention was fixed, but when left to himself he fell into a wandering state of mind, talking and making frequent complaints of pain in his head while tossing himself continually from side to side in bed. On the third day dark livid spots appeared, scattered sparsely over the whole surface but in greater numbers on the lower extremities and particularly around the joints; restlessness and delirium became aggravated and were accompanied with decided opisthotonos; the face was dark-hued, especially on the lips and alæ nasi; the pupils contracted; the pulse 96 and rather weak. As the case progressed the pulse rose to 106–130, while the dark moist coating of the tongue changed into a dry black crust, and sordes appeared on the teeth and lips. On the fifth day the patient lay on his back with the thighs and legs partially flexed, the toes contracted on the soles and the thumbs drawn into the palms. Subsequently the countenance became haggard, the eyelids half closed, the eyeballs fixed and the corneæ glazed, the extremities cold and the surface covered with a clammy sweat, the pulse hardly perceptible, the abdomen excessively tympanitic and the respiratory movements short and rapid. Death occurred April 1. On the second and third days small doses of tartar emetic and nitrate of potash were given every two hours with croton oil to the spine; on the fourth day these were replaced by eight grains of iodide of potassium every four hours; lastly carbonate of ammonia and wine were given. *Post-mortem* examination: Several recent adhesions were found between the dura mater and the visceral arachnoid, with thickening of the latter and a purulent mass between it and the pia mater, the vessels of which were enormously distended with black fluid blood. The spinal arachnoid was inflamed throughout; in the region of the third or fourth dorsal vertebra half an ounce of pus was found with softening of the substance of the cord.—*Act. Ass't Surg. F. C. Leber, Clay Hospital, Louisville, Ky.*†

CASE 84.—Private John L. Smith, Co. E, 74th Ohio, was admitted March 25, 1864, with mental derangement which soon passed into delirium. He pointed to his forehead and temples as the seat of violent pain, while at the same time his face was flushed and dusky, eyes injected and pupils fixed. A white fur on the tongue quickly changed to a dry brown crust; the pulse was 130, full but not hard, and the respiration quickened. He was very restless, made frequent attempts to get out of bed and when on his feet reeled like a drunken man. His delirium was of a humorous character. The treatment consisted of cold applications to the shaved scalp, abstraction of blood by cups on the temples and nape of the neck and the administration of a purgative dose of Epsom salt with one grain of tartar emetic, followed by smaller doses of the latter. During the night he was restless and did not sleep, but next day the pulse fell to 120 and the pain in the head abated somewhat, although there remained great heat of skin and dryness of tongue. He talked continually and still attempted to get out of bed. He did not seem to suffer from thirst, yet he drank whatever was offered him, such as milk, lemonade or water, without apparently noticing what he was taking. On the 27th the pulse was reduced in volume but not in frequency; the face pale; eyes dull and heavy; teeth and lips covered with sordes; efforts to talk were made but the patient could not articulate; his head was firmly retracted and there appeared on the surface, particularly on the neck and upper part of the chest, dark-colored patches having the appearance of blood extravasated under the cuticle. Dry cups were applied to the back of the neck, croton oil along the spine and a blister to the scalp. Stupor developed on the 28th, speedily deepening into coma and death. *Post-mortem* examination: The arachnoid was thickened; lymph was accumulated in the cerebral sulci and covered the entire base of the brain; the lateral ventricles were not distended with liquid, but the right posterior cornu contained a small quantity of pus and lymph. Numerous black spots were observed in the substance of the cerebrum, which appeared otherwise healthy. The spinal arachnoid was thickened and presented underlying exudation. The blood in all the vessels remained fluid. The thoracic and abdominal viscera were not examined.—*Act. Ass't Surg. R. Wirth, Clay Hospital, Louisville, Ky.*†

CASE 85.—Private Henry Clymer, Co. K, 128th Ind.; age 40; was admitted comatose April 5, 1864, and died next day. *Post-mortem* examination: Body muscular; rigor mortis fairly marked; face, head and shoulders bronzed. The veins of the cerebral membranes were distended; a layer of soft lymph covered the surface of the brain and a similar layer was found between the membranes; the brain was softened, particularly in its middle lobes; the medulla oblongata and pons were also somewhat softened; the gray substance was pale in color and few puncta were visible, but

*Surgeon RUSSELL'S cases were published in the *Boston Medical and Surgical Journal*, May 19, 1864.

†Surgeon ALEX. T. WATSON, U. S. Vols., in charge of the hospital, published this case in the *American Medical Times*, May 7, 1864.

the vascular processes in the interior of the brain were congested. The lungs, which weighed fifty-six ounces, were congested posteriorly and presented collapsed and œdematous patches of a dark-blue color. The heart was well supplied with fat; the walls of the right ventricle were thinned, those of the left ventricle were three-quarters of an inch thick, but their substance was easily torn; the right cavities contained a small fibrinous clot. The liver, seventy-nine ounces, presented the nutmeg appearance, and bile flowed from it on section; the gall-bladder was distended; the spleen measured nine by six inches and was unusually firm, bluish-gray externally, purplish-brown internally, the Malpighian bodies very distinct; the kidneys were externally of a bluish-purple color, the centre reddish-brown and the pyramids purple, streaked and patched with yellow. The omentum and mesentery were loaded with fat. The mucous membrane of the stomach, yellowish-gray in color, presented many small but highly congested points. The solitary glands of the small intestine were prominent, especially those near the ileo-cæcal valve, where also were many small ulcers each about two lines in diameter. The mucous membrane of the cæcum was bluish-gray, its follicles distended and pigmented; in the upper part of the rectum were several large dark-blue and brown patches, where the mucous membrane was softened and easily detached.—*Hospital No. 1, Nashville, Tenn.*

Case 86.—William S. Kay, a civilian, but formerly a confederate soldier, was admitted April 6, 1864, complaining of pain in his head, neck and back and in his bones generally; his eyes were injected and face flushed, but he was perfectly rational and able to walk up a flight of stairs—half an hour afterwards, however, he was delirious. He seemed to be in great distress, moving about in bed, raising himself up and falling back again; pulse rapid but not strong; no increase of temperature was perceptible about the head. Five cathartic pills were given; cups were applied along the spine and croton oil and sinapisms to the lower extremities; cold applications to the head distressed him. During the afternoon the patient was inclined to sleep; for some minutes he would lie quiet and then start up as if frightened. He took no nourishment and was indifferent to drink. The skin had become so insensitive that mustard applied for hours made no impression. During the night he was very restless. Next morning dark-red spots, varying in size and form, were found on his neck, breast and legs; he continued delirious, talking and moving constantly; his head became firmly drawn back and coma speedily supervened. He died thirty hours after admission. No *post-mortem* examination was made.—*Act. Ass't Surg. R. Wirth, Clay Hospital, Louisville, Ky.**

Case 87.—John B. Muzzey, a recruit; age 35; was admitted comatose April 7, 1864, having been taken two days before with severe chills and pain in the head and back. His body was covered with purplish-red spots of various sizes, one of which appeared on the right sclerotic; his eyes were closed, head somewhat thrown back, muscles moderately rigid, respiration 24 and labored, pulse 66, full and slow; he was unable to protrude his tongue. A hot bath restored his consciousness and he inquired—"Where all this water came from?" On removal to bed he was rubbed briskly with tincture of capsicum, after which he broke into a profuse perspiration. Four grains of quinine were given every two hours, with whiskey at the rate of ten ounces daily and beef-tea and milk *ad libitum*. In the evening he was stupid and unable to articulate; pulse 84. Six ounces of blood were taken from the neck and a cathartic of calomel administered. Next morning the skin was moist and the patient, with some support, sat up in bed, talked rationally and said he felt better; pulse 84, respiration 32 and tongue coated with a creamy fur. The quantity of stimulant and quinine was diminished. On the 9th there was an inclination to sleep; pulse 96, full and hard; skin hot and dry; tongue dry and brown. In the course of this day subsultus tendinum, abdominal respiration and involuntary evacuations were noted. Cupping the nape of the neck was again resorted to, followed by blisters to the neck and extremities. Next day, however, he was completely comatose; pulse 117, full and hard; respiration 44, sighing; pupils insensible; toes of the left foot strongly flexed; the spots had nearly disappeared. He died April 11 at 3 A. M. *Post-mortem* examination: A few spots were seen on the extremities. The vessels of the dura mater were turgid with blood and a layer of coagulable lymph one-sixteenth of an inch thick covered the whole of the arachnoid and pia mater; the lateral ventricles were filled with bloody serum and two ounces of a similar liquid were found at the base of the brain; the choroid vessels were injected. The medullary portion of the spinal cord was normal, but the membranes were deeply injected and the pia mater exhibited along the posterior aspect of the cord a layer of lymph-like exudation which was found to consist wholly of pyoid cells.—*Filbert Street Hospital, Philadelphia, Pa.*†

Case 88.—Wm. H. Allen, Co. B, 12th Mo. Cav.; age 18; of small stature and delicate constitution, was admitted April 11, 1864, having been sick for two days in quarters, during most of which time he had been delirious. On the day before he was taken sick he had eaten heartily of trash bought from a sutler and had drunk six bottles of ginger pop. On admission he complained of pain in his head, back, neck and throat; his expression was wild, and although at first rational, in a few hours he became delirious, talkative and restless, rising from bed and walking across the ward with a wild vacant stare. Constant attention was required to keep him in bed. Restlessness and delirium continued with little intermission until within a few hours of his death on the 20th. When roused he gave rational answers but immediately relapsed into delirium; his discharges were passed involuntarily; he complained of pain in his legs; the muscles of his back and neck were contracted; on the day before death his pulse was 160 and respiration 60; he took but little nourishment and ground his teeth constantly. *Post-mortem* examination: The membranes of the brain and spinal cord were highly injected; the cavity of the arachnoid contained an ounce and a half of serum; pus and lymph were deposited on the medulla oblongata, pons Varolii and spinal cord except in the cervical region, in which, however, the membranes were much injected; the lateral ventricles each contained half an ounce of sero-purulent fluid; the substance of the brain was congested and softened. The lungs were considerably congested. The mucous membrane of the stomach was quite dark in color and softened. No other morbid appearance was recorded.—*Surgeon Ira Russell, U. S. V., Benton Barracks, Mo.*‡

* See note to case 84.

† Act. Ass't Surgeon A. Douglas Hall communicated this case to the Committee on "Spotted Fever, so-called," of the American Medical Association. See Appendix to the Report of that Committee, p. 354, Vol. XVII of the Transactions.

‡ See note to case 82.

CASE 89.—Private Jas. F. Johnson, Co. H, 13th Ill. Cav.; age about 15; small and delicate, was admitted April 13, 1864. On the 10th he had eaten a large quantity of canned strawberries, apples and sardines. Next evening he had spasms and vomited freely, bringing up with the ingesta five large lumbricoid worms. He became delirious and had contraction of the muscles of the back and neck. Death occurred on the 17th. *Post-mortem* examination: The dura mater was injected; lymph and pus followed the course of the large cerebral veins and sulci and covered the medulla oblongata, pons and cerebellum; the brain was congested and softened and its ventricles contained seropurulent fluid. A large quantity of pus was found on the lower part of the cord and cauda equina. Both lungs were somewhat congested. Nineteen lumbricoid worms were found in the stomach and intestines.—*Surgeon Ira Russell, U. S. V., Benton Barracks, Mo.* *

CASE 90.—Private William Hurd, Co. C, 81st N. Y.; age 17; robust; was admitted April 27, 1864, having suffered for several days from severe pain in the head with nausea and vomiting. Shortly after admission he became delirious and had well-marked opisthotonos; pulse 84, full but not hard; tongue dry; teeth covered with sordes. Next morning a few indistinct dark spots were discovered on the loins. Two days later a circumscribed red spot, an inch in diameter and of inflammatory character, appeared upon the palmar aspect of the right forearm near the wrist, and from that time the arm was partially paralyzed. Delirium continued till within a few hours of death; it was active but not violent, the patient being easily restrained and capable of giving a rational answer when aroused. The tetanic spasm involved only the muscles of the neck. There was no suffusion of the face or of the eyes. The bowels were inclined to be loose and the stools dark. The urine was passed freely and contained no albumen. A few hours before death the pulse became more frequent and feeble, the muscular spasm relaxed, the pupils dilated and the patient unconscious. He died May 1. *Post-mortem* examination: Some hypostatic congestion; no spots visible except that on the arm, under which was some serous and fibrinous effusion. The brain was of full size, its veins distended. There was a moderate serous effusion under the arachnoid, and also a greenish membranous exudation, one to two lines in thickness, deposited in large patches over the cerebrum and along the course of the vessels extending into the fissures of Sylvius; this deposit was more abundant on the vertex than on the sides, on the left side than on the right and on the base than on the upper surface; an extensive patch, two or more lines in thickness, lined the fissures of the cerebellum and covered the crura cerebri, pons Varolii and medulla oblongata; the brain was very vascular but not softened, and there was but little serous effusion in the ventricles. The spinal cord was not softened, but was invested under the arachnoid in its whole length by a uniform plastic layer about two lines thick; a section of the cord, in its lower part, gave exit to a distinctly greenish liquid. The lungs and pleuræ were healthy. The heart, firmly contracted, contained a small fibrinous deposit near its apex. The liver showed generally a moderate amount of fatty degeneration with occasional patches of completely degenerated tissue; the spleen was healthy; the pancreas vascular; none of the solid viscera were softened. There were a few ecchymoses on the mucous membrane of the stomach. The intestines were tympanitic; the jejunum was normal; the ileum contained a small quantity of greenish fæces; Peyer's patches were distinct but not diseased; the vessels of the colon were much congested, especially at its commencement, and this condition lessened in proportion to the distance from that point; in the lower ileum and cæcum the mucous membrane was moderately softened, uniformly reddened and ecchymosed in many spots; the solitary glands were prominent and distinct as in cholera, each about the size of a millet-seed, but there was no ulceration. The mesenteric glands were unaffected. The semilunar ganglion and solar plexus showed no vascularity, softening or other indication of disease. The blood in the vessels was generally fluid.—*Central Park Hospital, New York City.*

CASE 91.—Private John Minisberger, Co. I, 90th Pa.; age 40; convalescing satisfactorily from a resection of the left elbow joint, rose on the morning of July 28, 1864, in his usual good health, dressed himself and went out to the pump for a drink as was his daily habit. About 6 A. M. he was suddenly seized with a severe pain between the shoulder-blades, the feeling being as if some one was pressing a bar of hot iron into his back bone. A mustard plaster gave speedy relief, and after the attack was over he got up and walked about the ward. An hour later the pain returned, but was relieved in ten or fifteen minutes by a reapplication of the mustard. He appeared to be sick at stomach and tried to vomit; he declined food but had no thirst. His strength appeared good, but after the attack he fell into a profuse perspiration and slept an hour or two. At 10 A. M. the pain returned with such increased severity that he cried out in anguish; it also lasted longer. At 11 A. M., on raising him up in bed for the application of cups, he was seized with a fourth paroxysm, and exclaiming "Oh! such pain!" fell over on the shoulder of an attendant and immediately became unconscious as if in syncope, his face deathly pale, eyes fixed, muscular system relaxed, radial pulse fluttering and breathing interrupted by long intervals. In a few minutes the pallor of the face and lips gave place to the lividity of asphyxia; the eyes were open, fixed and glassy, the left pupil contracted, the right dilated; the muscles completely relaxed and the pulse imperceptible at the wrist. He took afterwards only three or four long sighing inspirations, with long intervals between them, although ammonia was applied to the nostrils and Marshall Hall's method of artificial respiration was faithfully tried. He died at 11.30 A. M. There was no thirst or any unnatural warmth of skin during the five and a half hours his sickness lasted; nor were petechial or any other kind of spots visible on the surface. *Post-mortem* examination: On removing the skull-cap four ounces of blood and serum escaped; the veins and sinuses of the brain were congested with fluid blood; there was a moderate quantity of subarachnoid effusion over the hemispheres and the ventricles contained about an ounce of serum. The spinal cord and its membranes appeared healthy. The lungs were intensely congested with venous blood; the pleural cavities contained eight ounces of serum and the pericardial sac two ounces; the valves of the heart were sufficient. All the abdominal viscera were healthy except the kidneys, which were congested of a bright maroon color; the urine obtained at the

* See note to case 82.

autopsy was albuminous. The blood remained fluid everywhere; it was dark in color and flowed freely wherever an incision was made in the body.—*Ass't Surg. Geo. A. Mursick, U. S. V., Stanton Hospital, Washington, D. C.**

Case 92.—Private John Davis, Co. E, 8th Vt.; age 28; was admitted July 26, 1864, with quotidian intermittent of moderate severity. This was immediately checked by quinine, and the patient seemed in a fair way to recovery when, on the morning of the 31st, he remained in bed feeling weak and without appetite. The tongue was clean; there was no heat of skin or heart disturbance, but the countenance expressed a good deal of anxiety. He said that about midnight he had been seized with great restlessness which lasted twenty minutes, but he had not slept until towards morning. He did well during the day until 5.30 P. M., when he was again attacked with restlessness and convulsive movements resembling those presented by certain cases of hysteria. He became delirious, tossing himself about in bed and uttering shrill screams; his pupils were dilated; respiration 14; pulse 100 and full. Ice was applied to the head and spine and mustard to the epigastrium; a turpentine enema was given. No medicine was prescribed by the mouth as the ability to swallow appeared to be lost. Coma gradually supervened, and the patient died at midnight, twenty-four hours after the onset of the attack and six and a half hours after the full development of its character. Toward the last he was bathed in perspiration. *Post-mortem* examination: Body well developed; surface of back of neck and shoulders showing twenty-five or thirty dark-purple spots from the size of a mustard-seed to that of a pea, circular, somewhat elevated, with well-defined margins, and consisting of an infiltration of dark-colored blood in all the layers of the skin and to some extent in the subcutaneous connective. During the removal of the skull-cap about six ounces of serum colored with blood flowed away; the Pacchionian bodies were unusually numerous, large and adherent for a subject of 28 years; the arachnoid was opaque, especially over the vertex, and some limpid serum lay beneath it; the ventricles contained a moderate quantity of serum; the choroid plexus in the fourth ventricle was thickened and looked like a lamina of pale flabby granulations, but the vessels in the other ventricles presented no abnormity; the substance of the cerebrum, cerebellum, pons and medulla oblongata was moderately congested throughout. The theca vertebralis was well filled with serum, notwithstanding the large quantity which had escaped during the examination of the brain, and the cerebro-spinal fluid contained flocculi in the lumbar region; the arachnoid was opaque and the vessels beneath it intensely congested; the substance of the cord seemed healthy. The lungs were engorged and the middle lobe of the right lung contained an apoplectic extravasation as large as a walnut. The heart-clots were small. The blood was much more fluid than natural. The liver and intestines were healthy; the kidneys congested; the urine highly albuminous.—*Stanton Hospital, Washington, D. C.**

Case 93.—Private Simeon Bond, 37th Co. 2d Batt. V. R. Corps; age 25; a member of the hospital guard, was admitted from quarters on the evening of August 14, 1864. He had complained of debility and loss of appetite for several days, and the orderly sergeant thought him slightly out of his head. On admission he was weak, feverish, thirsty and sick at stomach, but did not vomit; pulse 90; he had headache but no other pain. Neutral mixture and aconite were prescribed. He was restless and slept but little during the night, and next morning he did not seem to realize where he was. He wanted to get up and steal away, but was quiet withal. His head was hot, eyes somewhat injected, tongue furred, pulse 95 and stronger. The ice-bag, a brisk purgative and acetate of ammonia with antimonial wine and nitric ether were prescribed. Morphia was administered in the evening and he passed a better night. On the 16th he was mildly delirious, sinking into stupor when left undisturbed; pupils somewhat dilated, symmetrical; eyes more injected; pulse 80 and full; respiration deep and regular but slower than natural. He had no spasm of any kind. A blister was applied to the nape of the neck and sinapisms to the epigastrium and inside of the thighs; quinine was given in full doses. His bowels had been freely moved. No improvement followed,—the stupor grew more profound, and he died comatose about 11 P. M., a little over forty-eight hours after his admission.—*Stanton Hospital, Washington, D. C.**

Case 94.—Sergeant Frederic H. Reed, Co. B, 175th Ohio, was admitted Oct. 16, 1864, complaining of severe frontal pain and slight fever; the latter came on daily in the evening and ended in a few hours without sweating. Castor oil with laudanum was administered, and next day he felt better. On the 18th there was slight delirium, with increased pain in the head. A six-grain dose of calomel was given; but as he raved incessantly, during the following night ice was applied to the shaven scalp and a blister to the nape of the neck, while two grains of tartar emetic with twenty-five drops of laudanum were given every two hours. On the 20th the delirium continued but with a tendency to stupor, which ultimately ended in coma and death on the morning of the 21th. *Post-mortem* examination: Pus was layered over the surface of the arachnoid and the meningeal vessels were injected; the ventricles of the brain were dry. The thoracic and abdominal viscera were normal.—*Hospital No. 8, Nashville, Tenn.*

Case 95.—Private Jesse Briner, Co. B, 50th Ind.; age 24; was admitted Oct. 20, 1864, in a comatose condition attended with opisthotonos; pulse 60, tongue moist and white, skin moist, pupils dilated and turned upward; he had been apparently in good health until the day before his admission. Blisters were applied to the back of the neck, the bowels were moved by repeated enemata and a quart of high-colored urine was drawn off by catheter. He died on the 21st. *Post-mortem* examination: Body large, well-formed, fleshy and without external marks of injury. The dura mater was congested and the surface of the arachnoid covered with a fibrinous deposit; the brain was congested and there were deposits of fibrin in the ventricles, at the base and over the cerebellum. The lungs were somewhat congested posteriorly and contained tubercles, chiefly aggregated in the lower lobes. The heart and the abdominal viscera were normal.—*Hospital No. 8, Nashville, Tenn.*

Case 96.—William B. Poer, a citizen of Missouri, died Dec. 3, 1864. *Post-mortem* examination: Body not emaciated. The posterior part of the cerebrum, the pons and the lower portion of the cerebellum were covered with a thin

* John A. Lidell, U. S. V., published this case in an article on *Epidemic Cerebro-spinal Meningitis* in the *American Jour. Med. Sciences*, June, 1865.

layer of pale purulent matter overlaid by the inflamed membranes; the medullary portion of the cerebrum was softened and presented many puncta; the ventricles contained only half a drachm of serum; the cerebellum was almost pulpy; the thoracic and abdominal viscera were normal.—*Act. Ass't Surg. J. E. Brooke, Rock Island Hospital, Ill.*

Case 97.—Randolph Moxley, a citizen of Missouri, admitted Dec. 16, 1864; died 27th. *Post-mortem* examination: About one drachm of pus escaped on removing the dura mater; the cerebrum and cerebellum were covered with pus; the lateral ventricles contained two ounces of turbid serum. The left lung was congested and adhered to the diaphragm, where it communicated with a cavity in the spleen containing four or five ounces of thick pus and a white calcareous deposit. The spleen was greatly enlarged, softened and disorganized as stated; the liver and mesenteric glands were enlarged; the colon and rectum were highly congested; the kidneys were normal in size but appeared somewhat softened.—*Act. Ass't Surg. J. E. Brooke, Rock Island Hospital, Ill.*

Case 98.—Private H. P. Sersing, 62d N. C. Meningitis. Admitted and died Jan. 19, 1865. *Post-mortem* examination: The surface of the brain was covered with pus, its substance softened and its membranes inflamed. The bladder was distended with urine.—*Act. Ass't Surg. H. C. Newkirk, Rock Island Hospital, Ill.*

Case 99.—Private Robert Redick, Co. F, 1st N. Y. Light Art'y; age 32; was admitted Jan. 31, 1865, at 8 P. M. This man was taken suddenly ill on the previous day with high fever and delirium; pulse 130, eyes injected, skin dry, tongue dry and coated, teeth covered with sordes, respiration slow, stools involuntary and the lower extremities and back covered with dark-purple spots in size varying from a pinhead to a large pea. On admission he was suffering from nervous prostration; the radial pulse was almost imperceptible; there was intense dyspnœa, a dull heavy feeling about the head and a dull pain between the shoulder-blades; the face was livid, the lips purple and the extremities cold. He died two hours after admission. *Post-mortem* examination: Body of full habit and fleshy, exhibiting spots of ecchymoses from one-fourth to three-fourths of an inch in diameter over the whole surface and hypostatic congestion in the depending portions. The bloodvessels of the brain were very much engorged; an ounce of serum was found in the cavity of the arachnoid, a similar quantity in each ventricle and about two ounces at the base of the brain; the Pacchionian bodies were largely developed; the substance of the brain normal. The spinal cord and its membranes were healthy. The heart was normal; a fibrinous clot was found in its right ventricle. Both lungs were highly congested, considerably collapsed and contained a few small apoplectic blood-clots; the bronchial tubes were filled with serum and frothy mucus. The liver was normal; the gall-bladder distended with dark viscid bile; the spleen congested. The stomach and bowels were distended with flatus. The kidneys were normal; the urine slightly albuminous. The blood generally was remarkably fluid.—*Stanton Hospital, Washington, D. C.**

Case 100.—Private John F. Risley, Co. B, 50th Ohio; age 24; was admitted Feb. 3, 1865, having been sick for five days. The disease commenced with a chill which lasted an hour and was followed by severe lumbar pain. On admission he had no headache, but pain in the loins was very distressing; he was restless and had a wild expression, a moist and coated tongue, full and rapid pulse, coryza, cough and some oppression of the chest; a dark rash, which disappeared on pressure, was noticed on the surface. Rochelle salt and morphia were administered and dry cups applied, but in the evening he was no better. He was restless during the night. Next day the dark rash covered the whole of the body; the patient was drowsy, his pupils contracted; abdomen tympanitic; respiration difficult. He died comatose before midday. *Post-mortem* examination: Chest, abdomen and posterior aspect of extremities covered with a dark-purple rash and petechial spots; face presenting purpuric patches but no petechiæ. The blood throughout the body was thin. The veins of the cerebral and spinal membranes were engorged and there was serum beneath the arachnoid; but the substance of the brain and cord was healthy. Ecchymosed spots were found on the parietal pleura and serum tinged with blood in each pleural sac, but the lungs were healthy. The peritoneum, mesentery, stomach and intestines were covered with scarlet and dark-red petechial spots. The liver weighed one hundred and sixteen ounces; the gall-bladder was large and full. The right kidney weighed eleven ounces, the left ten ounces; their capsules and the surrounding connective tissue were ecchymosed.—*Douglas Hospital, Washington, D. C.*

Case 101.—Private Elisha Cotton, Co. I, 36th Ohio; age 23; was admitted Feb. 18, 1865, with severe pain in the head. He was rational; his appetite good; bowels constipated; pulse 48. Castor oil with oil of turpentine was given and repeated. Next day four cups were applied to the nape of the neck, from which slight relief was derived; pulse 46. The pain continued and on the 21st delirium set in, which, on the 23d, became violent and accom-

*This case was communicated by Dr. D. W. Prentiss to the Committee on "Spotted Fever, so-called," of the American Medical Association, and published, p. 355, Vol. XVII of the *Transactions*. At the same time Dr. Prentiss submitted as a case of spotted fever the following, which appears on the records of the hospital as one of cerebral apoplexy: Private James K. Hayes, Co. C, 10th V. R. Corps, was admitted Jan. 7, 1865, with headache, assumed to be the result of a debauch. Next day persistent coma came on, and he died on the 10th. *Post-mortem* examination: Rigor mortis well marked. There was a quantity, about eight ounces, of effused blood between the membranes of the brain and a large clot on the side of the right hemisphere; the substance of the brain was healthy. There were old adhesions of the lungs, and, in the heart, slight induration of the aortic valves. The other organs were not examined.—*Stanton Hospital, Washington, D. C.* The coagulation of the blood is inconsistent with the theory of cerebro-spinal fever in this case, as in the following, which was apparently the result of violence: Private John Hutchinson, unassigned recruit; age 18; while wrestling Feb. 4, 1864, was tripped and fell heavily, striking his back, but he did not complain of injury and was present at roll-call in the evening. Next day, however, he remained in his tent, where, in the evening, he was found groaning. On admission to hospital at this time he was very restless and delirious, unable to reply intelligibly and lapsing into drowsiness occasionally for a few minutes at a time; his extremities were cold but the surface elsewhere was natural; the odor of alcohol was detected about his person. During the night he had two loose stools; his tongue became red and dry and sordes appeared on his teeth. On the 6th the delirium was more active; he tried to get out of bed—moved in every direction, rose on his knees and was restrained only by force; his pulse was rapid and weak, 130; abdomen not tender. He refused to swallow medicine; two small doses of quinine and opium were given per rectum. Towards midnight he became comatose and died. *Post-mortem* examination: Body well developed and showing no marks of violence. The membranes of the brain were much congested; the substance of the brain healthy. The membranes of the spinal cord were congested, and external to the dura mater there was some clotted blood which decreased in quantity from above downwards. The lungs, liver, spleen and kidneys were congested; in one of the kidneys was a clot of blood the size of a pea between the capsule and parenchyma. The bladder was distended with slightly albuminous urine. Peyer's patches and the small intestine generally were slightly congested.—*Turner's Lane Hospital, Philadelphia, Pa.*

panied with accelerated pulse, 100. On March 1 there was marked prostration, with muttering delirium; pulse 120. He died on the 3d. *Post-mortem* examination: The pia mater was injected; lymph was deposited at the fissure of Sylvius, around the sella turcica, on the surface of the cerebellum and pons Varolii and on the roots of the optic and pneumogastric nerves; the pons and cerebellum were injected and softened; the substance of the brain was congested and its ventricles contained serum and fibrinous deposits.—*Cumberland Hospital, Md.*

Case 102.—Private W. G. Hicks, Co. L, 1st N. H. Heavy Art'y; a temperate man of full habit; complained from March 1, 1865, of pain between the shoulders, but was otherwise apparently well. On the 22d he was seized with a severe chill and headache, for which a mercurial purge was taken; at 10 P. M. the pain extended along the spine and was attended with vomiting and some febrile action; pulse 100. Three cathartic pills were given, with cold applications to the head and mustard to the back of the neck. He vomited the medicine, passed a restless night, and in the early morning went out and walked half a mile, when he was found nearly insensible. On admission to hospital on the 23d he was partly conscious but unable to speak; his face was flushed, skin hot and dry, pulse 100 and feeble; his eyes opened when he was addressed, his right hand moving incessantly toward his head, which was thrown back by tetanic spasm; his lower extremities were also in constant motion; he moaned at short intervals and resisted efforts to open his mouth for the administration of food and medicine. Six wet cups were applied to the back of the neck and were followed by a cantharidal blister; mustard was used along the spine and on the feet and calves of the legs; two drops of croton oil were given and ten grains of the sulphate of quinine. At noon the bowels were moved freely, but the patient was unconscious and the opisthotonos aggravated. At 9 P. M. there was no change, although the blister had drawn well. Ice was applied to the head and beef-essence given freely. He passed a restless night, his lower extremities in constant motion and his breathing labored. He died at 7 P. M. in an attack of severe tetanic spasm. *Post-mortem* examination: Body robust. The pia mater covering the cerebrum, cerebellum and cord was much congested. The brain was not examined. Beneath the spinal arachnoid was a large collection of pus, which seemed mixed with a small quantity of oil; the substance of the cord appeared healthy. The right ventricle of the heart was nearly filled with a firm coagulum. The lungs were healthy.—*Hospital, Fort Reno, D. C.*

Case 103.—Private Benjamin Lond, Co. E, 2d Mass. Cav.; age 19; was admitted April 4, 1865, complaining of aching in all the joints. His knees were slightly swollen; pulse 100, weak; tongue large and red, with prominent papillæ and a dirty-white fur. He remained in this condition, his appetite good, until the 10th, when he was seized with pain in the back of the head and neck and opisthotonos. He gradually grew worse, his countenance becoming anxious, pulse 130, mind confused, tetanic spasms more violent, pupils dilated and deglutition difficult. He died on the 27th. *Post-mortem* examination: The membranes of the brain were congested and its sinuses turgid with blood: lymph was deposited around the optic nerves, the pituitary gland and along the anterior surface of the medulla; the substance of the brain was softened, its ventricles filled with serum and the choroid plexus of each congested and thickened. The membranes of the spinal cord were inflamed. The lungs and pleura were healthy. The pericardium was congested and contained an ounce and a half of sero-pus; the mitral valves were thickened. The abdominal viscera were normal.—*Cumberland Hospital, Md.*

Case 104.—Private George W. Ferguson, Co. G, 8th Tenn. Cav.; age 18; was admitted Dec. 2, 1864, with chronic diarrhœa, from which he recovered and was placed on light duty. On April 10, 1865, he had vertigo and his eyes were inflamed. On the 19th a slight chill was followed by high fever, the patient's face being flushed and swollen, eyes suffused, respiration hurried, skin hot and dry, tongue heavily coated with whitish fur, bowels loose, pulse 120 and full, limbs weak and sore. At 4 P. M. he had a copious perspiration, lasting an hour, and followed by a recurrence and aggravation of his former symptoms, which continued during the night. On the 20th he was delirious; at 11 A. M. comatose, pupils dilated, evacuations frequent and involuntary, thin, very offensive and of an ochre color; at 3 P. M. opisthotonos and trismus supervened, pulse 120, full and strong, respiration 30, loud, abdomen tympanitic; at 8 P. M. he had several severe convulsions followed by increased opisthotonos and trismus, which continued until death at 11 A. M. of the 21st. He was treated with veratrum viride and ipecacuanha, with nitrate of potash, turpentine enemata, mustard to the abdomen and extremities and ice to the head. *Post-mortem* examination: The membranes of the brain were congested and the sinuses filled with dark blood; the brain weighed sixty ounces; its substance was softened, especially in the corpus callosum, optic thalami and pons; the lateral ventricles contained two drachms of bloody serum and the choroid plexus in each was highly congested; the medulla oblongata was softened. The lungs were engorged. The heart, stomach and large intestine were healthy, but the lower part of the ileum was congested and the mesenteric glands much enlarged. The liver and kidneys were congested; the gall-bladder much distended; the spleen larger than normal.—*Hospital, Madison, Ind.*

Case 105.—Private James Wesley Turner, Co. D, 126th Ohio; age 30; was admitted at 2 P. M. June 27, 1865, from his regiment, which was en route home. He was insensible; his eyes much injected and watery; pupils contracted and fixed; lips covered with sordes; head hot; general surface of natural temperature but covered thickly, especially on the legs, arms, back and face, with dark-purple spots, some of which were elevated, having a diameter of from one-eighth to three-eighths of an inch. He lay on his back with his knees drawn up and head thrown back, but he was withal very restless; there was tenderness on pressure over the occiput and spine. As the bladder was much distended the catheter was used and fifty ounces of high-colored and strongly ammoniacal urine were removed with decided relief to the restlessness. At 3 P. M., on the manifestation of some tetanic spasm, bromide of potassium was ordered in fifteen-grain doses hourly until 9 P. M. and thereafter every two hours. At 6 P. M. the patient was quiet. After the withdrawal of forty ounces of urine by catheter at 10 P. M. the tetanic condition disappeared, the eyes became less suffused, the pupils dilated somewhat and responded to light and the maculæ seemed of a brighter color; respiration was natural. He slept well for three hours during the night, but towards morning became a little

restless; he drank water and was able to hold the cup in his hands. At 8 A. M. thirty-six ounces of urine were removed, the patient evincing great dislike for the operation. A teaspoonful of a solution of one grain of sulphate of strychnia in four ounces of camphor-water was directed to be given every two hours, alternating with the bromide, the spine to be rubbed with a liniment of ammonia, olive oil, chloroform and turpentine. In the evening he was quite conscious; he gave his name, said he was married and that his home was in Lawrence, Ohio. At this time the strychnia was omitted and the bromide reduced to ten grains every four hours. He was comfortable during the night, urinated voluntarily and had two stools towards morning. On the 29th a teaspoonful of a solution of sixteen grains of sulphate of quinia and one grain of sulphate of morphia in three ounces of water was ordered to be taken every four hours; a tablespoonful of brandy with milk was also given. At 11 A. M., after the second dose of quinia and morphia had been taken, he became unconscious but without tetanic symptoms; eyes injected; pupils contracted; head hot and perspiring profusely; general temperature elevated; pulse 180; impulse of heart strong and respiration hurried. The quinia-morphine solution was omitted and the bromide renewed every two hours; tincture of veratrum viride in three-drop doses was also ordered to be taken every two hours, but as it made no impression it was discontinued. He grew steadily worse, passing urine and fæces involuntarily. At 1 A. M. of the 30th he had a severe chill which lasted an hour and was followed by high fever, after which his pupils gradually dilated and coma supervened, ending in death at 5 P. M. *Post-mortem* examination: The skin was of a decided yellow color. The membranes of the brain were much injected; the anterior, superior and posterior surfaces of the cerebral hemispheres, the cerebellum and medulla oblongata were covered with patches of yellowish matter which were thickest along the median line and in the sulci; there were about two ounces of bloody serum at the base of the brain; the brain-substance was normal: the pineal gland congested. The membranes of the spinal cord were deeply congested and filled with bloody serum. The pericardium contained three ounces of blood-tinged serum; the coronary vessels were turgid; the walls of the heart softened; the aorta reddened. The right lung was slightly congested; the left much congested posteriorly, partially hepatized and softened. The omentum was congested in patches; a portion of the lower ileum, about two feet in length, was congested. The blood was dark and uncoagulated except a slight clotting in the right ventricle of the heart.—*Cumberland Hospital, Md.*

Dr. CALVIN G. PAGE has published* the clinical records of nineteen cases of cerebro-spinal meningitis that occurred among recruits at Galloupe's Island, Boston Harbor, Mass., from September, 1864, to May, 1865. Medical Inspector G. H. LYMAN, U. S. Army, referred, March 20, 1865, the causation of these cases to overcrowding and defective ventilation. Measles prevailed among the recruits at the same time.

The post was organized for the reception of recruits and drafted men from this state, and as a depot for those in transit from the rendezvous in Maine and New Hampshire. There are twenty barracks in all; four are occupied by the permanent garrison, the remaining sixteen, 100 x 20 x 10 feet and furnished with two tiers of bunks, were each intended for one hundred recruits, giving two hundred and eighty feet of air-space per man. These quarters have been sufficient for the post until this winter, when they became overcrowded, owing to the difficulty of obtaining transportation. Each barrack has been occupied by an average of from one hundred and fifty to two hundred men. The consequence has been an increased amount of sickness and the development of a few cases of cerebro-spinal meningitis. To add to the difficulty an epidemic of measles occurred, but this is now declining.

The following excellent report of fulminant cases among recruits at Concord, N. H., was filed March 1, 1865, by Act. Ass't Surgeon ALBERT H. CROSBY. Overcrowding had apparently little to do with these developments, as none of those affected had been at the rendezvous for more than a few days. The evidence points rather to an infection in the locality whence the young men were derived.

I have the honor to report the details of eight cases of epidemic cerebro-spinal meningitis, five of which occurred in camp under my personal observation. Of the latter four died, and as the disease seems now to be attracting attention, owing to its appearance in other places, I have thought that a record of these might be of value.

CASE 1.—Gilman McAlpin, recruit, 18th N. H.; age 20 years; in camp six days; well developed, with light hair and eyes and lymphatic temperament, came into hospital January 30, saying he had had a fit. As he came from the barracks and had no bunk mate I could not obtain a reliable account of this fit or of his condition during the previous night. At this time, 8 A. M., he was somewhat feverish and intensely thirsty; he was inclined to vomit and had frequent dark-colored and fetid watery discharges from the bowels; his pulse was small, thread-like and rapid and his extremities cold; tongue covered with a brownish coat; skin dry and harsh, but subsequently bathed in a clammy perspiration. He was immediately placed in bed; hot stimulating drinks were administered, with powders of quinine and capsicum. Four hours afterwards he became very restless, throwing himself about in bed, groaning and pressing his head with his hands, his eyes somewhat injected and watery and the pupils dilated. At 2 P. M. he ceased to answer questions, but the jactitation increased and the groans changed to screams, the patient being apparently in great pain, which seemed general and not confined to the head. At 3 P. M. many petechiæ were discovered below the knees and on the forearm and hands,—small and of a bright-red color, not changing or disappearing under pressure. About

* In the *Boston Med. and Surg. Jour.* LXXIII., 1865, page 109 *et seq.*

the same time the head was drawn backward upon the neck, and this position was not altered even in his most restless moments. The treatment was stimulating, with heat to the extremities and general friction. The watery discharges from the bowels continued, becoming involuntary during the night; there was also occasional vomiting. At 9 P. M., I called Surgeon J. SMITH ROSS, U. S. N., in charge of the Depot hospital, to see the case. He suggested cerebro-spinal meningitis and advised a continuance of the treatment, with immediate vesication of the spine from the occiput to the dorsal vertebræ and the free use of turpentine internally by enema and externally by friction. This was accordingly done. The symptoms remained as described for five days, when the patient began to grow more quiet and to notice what was said to him. It was then discovered that he was totally deaf and that the sight of the right eye was wanting. He was able to read questions written upon a slate and to make intelligent replies. On the eighth day after his seizure he began to complain of excruciating pain in the knees, both of which were found to be swollen and tender. A wash containing acetate of lead and opium soon gave relief, and from this time convalescence was rapid. To-day, March 1, he is able to be out of doors, slightly deaf and with some dimness of vision.

CASE 2.—February 2, at 11 A. M., I was called to see a recruit for the 18th regiment, Henry H. Hook, aged 19 years, who had been four days in camp. He was an uncommonly stout, well-built young man, and obviously of great muscular strength. I found him lying in the bunk next to that which had been occupied by McAlpin, and my attention was at once attracted to certain very dark-purplish spots upon his cheeks and neck. In fact, his whole body and limbs were covered with them, from the size of a half-dime to that of a Spanish dollar. He complained of nothing but a slight pain in his head and intense thirst; said he had vomited once and had one thin discharge from the bowels. At this time it was impossible to detect any radial pulse, and the action of the heart was well described by the hospital steward as *a jerk and a flutter;* respiration thirteen per minute and quite loud; extremities cold. He was at once removed to hospital and an actively stimulating treatment commenced. Whiskey and quinine were freely administered; sponges saturated in alcohol placed in the axillæ; alcohol, hot water and turpentine used freely upon the body and limbs, and constant friction maintained by two "reliefs" of four men each. Professor D. CROSBY, of Dartmouth, happening to be in town, was called in, but declined to give an opinion as to the disease. Dr. ROSS, U. S. N., also saw him. Both concurred in a fatal prognosis. After two hours of incessant labor the radial pulse could just be felt but could not be counted. At this time the patient said he felt better and was confident he would recover. The spots on the surface became darker and more numerous and the eyes injected and watery, but the pupils continued nearly normal. Toward evening respiration became more hurried and the patient vomited several times, the ejected matters consisting merely of the fluids he had taken during the afternoon. His mental faculties were entirely unobscured until two hours before his death, when he became comatose. He expired at 9 P. M., just ten hours after he entered the hospital. He was probably sick about thirteen hours, for it was found that he was up and dressed early that morning and that he partook of breakfast at 7.30 A. M. It was also learned that during the previous day he had been eating canned lobster, and that during the evening he had been in unusually good spirits, having kept his comrades from sleeping by his jokes and fun until 11 o'clock. As the body was removed at once it was impossible to make a *post-mortem* examination.

From February 2 until the 15th we had no other case of the kind and were hopeful that we had seen the last of the disease, but upon the morning of this day occurred CASE 3.—Albert B. Goldsmith, recruit 18th N. H., age 18, who had been six days in camp, and was a stout, hearty, fine-looking fellow. He was admitted to hospital at 10 A. M. suffering with headache, rigors, intense thirst and vomiting; pulse 126 to 130, small and thread-like; tongue covered with light-brown fur; extremities cold and skin moist and clammy. He was at once put under treatment similar to that applied to the last case,—this by the advice of all the physicians who saw him. For some hours his system responded and we seemed in a fair way to get reaction established, when, at 9 P. M., the fatal plague-spots made their appearance on the leg, thence spreading over the whole body, but much less numerous than in Hook's case; the color, however, was the same, dark purple-like ecchymosis. Respiration now became hurried, rising from 12 to 20 per minute, and a rattling sound was heard in the trachea. He complained of no pain and talked freely about an expected furlough. Three hours later he became utterly unconscious and expired at 2 o'clock, fourteen hours after entering the hospital and five hours after the appearance of the spots.

The disease had now become so serious that I requested the commanding officer of the rendezvous to convene a board of medical and military officers to investigate it and make a thorough sanitary inspection of the camp. Such a board was in fact ordered, but owing to pressing official duties Surgeon ROSS of the Depot hospital was not able to attend, and only a partial autopsy was made in the case with the assistance of Dr. A. H. ROBINSON of this city: Rigor mortis slight; body more mottled than before death; on reflecting the scalp we found a large quantity of fluid blood opposite the occipital protuberance; this flowed freely and ran in a stream to the floor. Upon removing the calvaria there was a slight escape of serum with some blood intermixed; the membranes of the brain seemed to have lost their clear silver-like transparency and were dark-colored; the superficial veins were distended with dark blood and were considerably increased in size, many of them being as large as a common quill; the sinuses were also enlarged and distended with uncoagulated blood. The substance of the brain was apparently healthy; the ventricles contained a moderate quantity of serum, and the choroid plexus was natural save in color, which was lighter than usual. The tentorium was darker and more opaque than the dura mater and arachnoid and seemed distended with fluid; on puncturing it slightly there was an immediate and rapid flow of greenish-yellow syrupy liquid,—in quantity about five ounces; the veins of the cerebellum were distended and the surface dark in color. Nothing unusual was observed in the medulla or the upper portion of the cord. The spots on the skin were found to consist of dark blood effused into all the tissues down to the subcutaneous cellular; on dissecting off a portion the color was perfectly retained by covering the cut edges with gum-paper. As it was necessary to send the body home for

interment by an early train I was obliged to stop the examination at this point; but it was continued by some medical gentlemen after the body reached home, and I am indebted to Dr. T. F. BROWN, of Chester, for the report of the autopsy of the trunk and contained organs, made about forty-two hours after death by Drs. BROWN, EASTMAN and CLARK: The integument on the neck and breast was of a scarlet hue, with spots of extravasated blood throughout the greater part of the remainder of the body. The internal organs were engorged with bluish-black blood, the veins of the chest in particular being filled with blood almost blue in color. The liver was generally darker than natural and the thinner portions of its lobes presented a marbled blue appearance. The mucous coat of the stomach was intact, but the others were congested, the inflammatory condition of the middle and submucous showing in irregular light-red spots through the mucous lining; some of these were mere points, others extensive patches. The intestines were normal. The lungs appeared natural. The other organs were not examined.

Four days more elapsed when we had CASE 4.—John C. T. Webster, recruit, 18th N. H.; age 19 years; five days in camp; came into the dispensary and asked me to look at his arms to decide if certain spots he had discovered were like those upon Goldsmith. To be sure they were,—the same dark-purple spots, only few in number and small in size. He complained of nothing but thirst, and the only other obvious symptom was the injected and watery appearance of the eyes; pulse 112, soft and small. The treatment was the same as in Hook's case,—stimulation by every known method within reach and every effort to restore the skin to its natural condition. He complained of no pain at any time, and was only troubled by excessive nausea and frequent vomiting. Three hours after taking to bed he became entirely comatose and remained in this condition eight hours. During this period our efforts to induce reaction were unremitting, and at 9 P. M. nature rewarded our labor, for the patient opened his eyes, the pupils of which were slightly dilated, and recognized me, calling me by name and expressing a desire to pass water, which he accomplished with ease. He drank a glass of whiskey-punch, holding the tumbler himself, and said he felt perfectly well. The stimulating treatment was continued during the night and he apparently grew no worse; answered when spoken to and changed his position in bed frequently. His extremities were warm and the skin natural, with no new spots. In fact I could not but believe that he was in a fair way to recovery. This continued until 6 A. M., when he called for water; the attendant stepped to the table to prepare him a punch. Immediately a gurgling sound was heard, and when the nurse turned he found the patient's head thrown back on the pillow, the spots on his face darker in color and the breathing slow and labored. Everything that was possible was done to arouse him, but he sank rapidly, and expired at 6.45 A. M., twenty hours after the attack. The *post mortem* examination in this case also was hurried; but the following was developed: Brain healthy save in the distention of its veins with fluid blood; membranes dark and with a considerable effusion of light-red lymph about the cerebellum. Lungs and liver engorged but healthy. Stomach covered in places with light vermilion spots which showed through the intact mucous coat and also through the peritoneal covering; the muscular coat was engorged with blood,—in fact, by holding a freshly-cut piece edgewise the division between the three layers was perfectly distinct, the muscular portion seeming more than one-sixth of an inch in thickness.

CASE 5.—George D. Moore, recruit, 18th N. H.; a fine-looking, healthy young man; age 21; twelve days in camp; came into the dispensary February 23, and after leaning against the counter invited my attention by the inquiry if I thought he had *the disease*. He complained of thirst and great pain in the head; his eyes were injected and overflowing; pulse small and rapid; respiration hurried. He was at once placed in the ward and an active course of internal and external stimulation commenced. Turpentine was given rather more freely than in the other cases, and was used generally about the body. At this juncture Capt. Silvey, Assistant Provost Marshal General for the State and *ex officio* at the head of the recruiting service, requested me to telegraph to Hanover for Professor DIXI CROSBY. This was done; he and some other medical gentlemen were summoned, but unfortunately did not arrive in time. This patient said he had felt unwell in the night and been very thirsty for hours, but pain in the head had not come on until after daylight. He was put under treatment at 8 o'clock. Under the influence of a drink composed of whiskey, ginger and capsicum he rallied somewhat and his pulse gained in strength but did not increase in frequency. About 10 A. M. one spot made its appearance on his leg, followed in two hours by a few others sparsely distributed over the body. The purple spots were less marked in this case than in any of the others. About noon he became comatose and his respiration slow and very peculiar; he would draw in the air with a prolonged effort, and after a second or two suddenly expel it with great force,—repeating this eleven times per minute. Before becoming completely unconscious he would snap with his teeth at the glass containing his drink or medicine and was apparently in some pain, although he could not be induced to answer questions. At 2.45 P. M. he threw his head back violently upon the pillow; his breathing became shorter and was accompanied by a rattling in the trachea. He died at 3 P. M., seven hours after his admission. *Post-mortem* examination seventeen hours after death, in presence of Drs. D. and H. B. CROSBY, Dartmouth College, and Dr. F. H. STILWELL, U. S. A.. Rigor mortis well established; considerable discoloration about the neck and helix of the ear,—in fact this has been observed in all the fatal cases. On cutting through the scalp blood of a dark color flowed readily; the membranes of the brain were nearly or quite natural and the veins and sinuses but little enlarged. All present, however, were struck with the very great difference existing in the size of the hemispheres, the right being less than two-thirds the size of the left, and the dividing line, instead of running exactly in the centre, ran directly under the right parietal protuberance. There was a very slight effusion into the ventricles, and the substance of the brain was apparently healthy. Upon removing the cerebellum entire, small points of calcareous matter were discovered at the base, on the surface and under the investing membrane. There was no effusion into the ventricles and the cerebro-spinal fluid was normal in quantity. The lungs were somewhat engorged, blood flowing freely after the scalpel; and the same was true of the liver, although the color of the latter was nearly natural. The stomach was filled with an amber-colored liquid, probably consisting of

the medicines and drink administered, and in the interior, near the large curvature, were scattered bright vermilion-colored spots arranged in points and patches.*

It should be stated that all these young men came from Chester and its vicinity. In fact these and three other cases which occurred at home during the last week of February, came from or resided within a radius of ten miles from that village. I am indebted to Dr. BROWN, of Chester, for a report of the case of a young man who died within a few rods of Goldsmith's residence:

CASE 6.—H. M., a young farmer, 19 years of age, of strictly temperate habits, who had not been from home for several months, complained of a feeling of uneasiness during the forenoon of February 17, but continued about his business until 4 P. M., when he gave up his work on account of headache, and thinking he had caught cold took some domestic stimulants to overcome the feeling of chilliness which oppressed him. He had a burning thirst, which was allayed by copious draughts. Severe rigors were experienced during the night, and he had several dark-colored discharges from the bowels; the urine was free and apparently natural. This was gathered from the attendant, as I was not called until 8 o'clock next day, at which time the respiration was hurried and the pulse at the wrist almost imperceptible, though the heart could be heard, its first sound being a kind of snap, the second only a quiver or tremor. The left side of the face was swollen, the eyes congested, the skin beginning to show the peculiar spotted appearance of extravasated blood, dark-red and generally distributed over the surface; one spot was large, three or four lines in its longest diameter. His ears were bluish, especially at the helix. The respiration continued rapid and the heart beat with less force until midnight, when he died. During the whole time the intellect remained clear; the patient said he suffered no pain, yet his countenance wore an indescribable look of anguish and despair, although he had not been informed of the terrible nature of the disease. No *post-mortem* examination was obtained.

CASE 7.—A furloughed soldier from the 18th N. H. died at his home February 27, in Londonderry, after an illness of eleven hours, with symptoms like those of Hook. No report of his case could be obtained.

CASE 8.—A young woman employed in one of the factories at Manchester died February 28. She was apparently well the evening before, but woke up in the night complaining of violent pain in the head and intense thirst, soon followed by chills. She was treated by a Thompsonian with the usual red pepper and hot bath. These at first relieved her, and the spots did not make their appearance until 9 A. M. They were of a dark color and very numerous. Other physicians were called, who persisted in a stimulating course of treatment, but she became comatose and at 2 P. M. died, thirteen hours after she first complained.

It will be seen that in all the fatal cases the spots were of a dark-red or purple hue, while in the first case, which recovered, they were bright-red and small in size; all had rigors, the chill being usually the first symptom; all complained of thirst and all but one of pain in the head; in all there was an injected and watery condition of the eyes; in all the intellect was clear until the supervention of coma; all were under twenty years of age and of remarkably good habits, sons of farmers in the same neighborhood; all had been in camp only a few days; none of the permanent garrison or recruits from other places were attacked. It is worthy of notice that the history of six of these cases shows that on the day preceding their seizure the patients were in uncommonly good spirits. This was so marked in the cases of Hook, Goldsmith and Webster that it was observed at the time by their comrades, and I am informed that the same was true of the young woman who died at Manchester. Only two points of uniform resemblance are observed in the *post-mortem* appearances: 1st, The unusual fluidity of the blood, and 2d, the peculiar spots upon the inner coat of the stomach. The appearance of the brain and its surroundings differed in every case, and in no case was there true inflammation. Great uniformity will be observed in the manner of death, *i.e.*, rapid asthenia, all seeming to have been prostrated at once by the shock of the invasion acting upon the nervous centres. In conclusion I would state that I adopted every means in my power to prevent the spread of the disease. The cases were put in a separate ward; the recruits themselves were isolated. The whole hospital and barracks were thoroughly purified and ventilated; free use was made of the disinfectant agents furnished by Government. Permission to furlough the men from the particular locality whence all these cases were derived was refused by the Secretary of War on the ground that this measure might tend more to the *propagation* than the suppression of the epidemic.

AMONG THE COLORED TROOPS, according to Surgeon IRA RUSSELL, U. S. Vols., the disease presented essentially the same features as in the cases of white men. This officer when on duty at Benton Barracks, St. Louis, Mo., observed an epidemic in January, 1864, among the colored troops at that rendezvous. The men, who were mostly escaped or emancipated slaves, had endured many hardships before their arrival. They were crowded together in imperfectly heated quarters and had an insufficient supply of clothing for the very cold weather of that season.

Forty-two cases were reported, many of them genuine cases of cerebro-spinal meningitis,—*post-mortem* examination showing exudation of lymph or pus on the arachnoid of the brain and spinal cord, with the superficial cerebral vessels highly congested and the arachnoidal and ventricular cavities filled with serum. The early symptoms were much like those of pneumonia: The patient had a slight chill, white tongue, small rapid pulse, dull headache and pain in the back and limbs. These symptoms continued several days, when a severe chill ensued, attended at first with violent delirium and afterwards with coma, the surface all the while cold, the pulse small or

* A water-color drawing of these light-red spots of submucous extravasation was filed with Dr. CROSBY'S report.

imperceptible, the muscles of the back retracting the head spasmodically and those of the legs and arms more or less rigid, deglutition imperfect or impossible, and death as the usual result. Occasionally, however, after from one to four days, reaction took place, warmth returned to the surface, the spasms relaxed, coma was dissipated, and fever of a typhoid type set in which ran a longer or shorter period with variable results. Quinia was given freely in the early stages to exercise a controlling influence over the disease. During the cold and comatose stages sinapisms to the surface and cups to the spine were employed, with quinia, capsicum and alcoholic stimulants internally.

Perhaps the epidemic among the negro laborers at the cavalry depot at Giesboro' Point, Md., was an outbreak of this disease, but the records do not identify it. The request of the superintendent for assistance, dated Nov. 25, 1863, states that "colored men perfectly healthy at night are found dead in the morning and many of the employés are becoming panic-stricken." A board of medical officers appointed on the following day to enquire into the causes of the epidemic did not extend its researches beyond the official requirement. The opinion was submitted that the preponderating causes of the epidemic existed prior to the admission of the negroes into the camp, there having been exposures and lack of suitable food and clothing, and that the development of the disease had been consummated by the continued operation of these causes, together with sleeping on damp hay in Sibley tents without floors or ventilation. The report states that the epidemic affected chiefly those who had come from the eastern shore of Maryland and Virginia, and that among five hundred men from these localities there had been twenty-eight fatal cases. But nothing is said of the disease in its clinical or pathological aspects.

Among the Confederate Troops.—A single case from the records of the Pettigrew hospital, Raleigh, N. C., signed by E. Burke Haywood, C. S. A., appears among the papers on file in this office. The case was regarded as one of typhoid fever, but opisthotonic rigidity and paralysis sufficiently indicated the implication of the cerebro-spinal system.

Private John Snyder, a conscript from North Carolina; age 39; muscular and strong; was admitted March 9, 1864. He complained of being chilly and had some fever. Four grains of Dover's powder were administered every three hours. In the evening the skin was moist though there was still some fever. Epistaxis occurred during the night, and next morning the pulse was 85 to 90 and moderately full and the tongue coated with a white fur. Sweet spirit of nitre in teaspoonful doses was ordered every two hours. Soon afterwards he complained of nausea and vomited some blood with bile and curdled milk. A sinapism was applied over the epigastrium, after which the vomiting ceased. In the evening he had some pain in the back and aching in the legs; as his bowels had not been opened for several days a pill of blue mass, rhubarb and aloes was administered. At 7 A. M. of the 11th his pulse was about 90, less full and more compressible; the tongue when projected was somewhat pointed and still furred; he complained of aching in the neck, shoulders and legs, and of pain in the small of the back; he was rather dull in answering questions. His bowels being still confined, he was given a tablespoonful of castor oil, which quickly produced two good stools. A sinapism was applied over the lumbar region. The disease appearing to be typhoid fever, oil of turpentine, five drops, with sulphate of quinine, one grain, and sweet spirit of nitre, a drachm, were given every three hours. In the afternoon he was reported worse and was found scratching continuously against the wall of the room with his right hand, his brow corrugated, pupils dilated and expression wild; he was also speechless; pulse about 90; temperature raised; muscles of the extremities and back rigidly contracted. Sixteen ounces of blood were drawn. An hour afterwards there was no change in the symptoms. Various measures were tried,—hot foot-baths, sinapisms to the back of the neck and down the spine, bandages dipped in hot turpentine wrapped around the legs and allowed to remain until in some places blisters appeared,—but the patient grew worse; the pupils contracted almost to the size of a pin's point; the eyes became much congested; the breathing stertorous and suspended at intervals for fifteen to twenty seconds; he strangled when liquids were placed in his mouth. He died at 4.30 next morning. From the beginning of the attack to the end his right arm was active but the left leg was motionless.

The *Confederate States Medical and Surgical Journal*, published under the auspices of the Surgeon General's Office, C. S. A., contains two articles on cerebro-spinal meningitis.

In the first, Surgeon G. A. Moses, of Mobile, Ala., called attention to the disease as he observed it among the negroes. He was particularly struck by the suddenness of its declaration, its rapid development and termination. The subjects, generally young and robust, were to all appearances in good health, when a chill or pain in the head attracted attention. This pain was concentrated about the base; the neck became stiff and pains were felt in the extremities or in the abdomen; opisthotonic convulsions occurred, every movement attended with intense pain. Meanwhile the patient became stupid and ultimately comatose, the pupils dilated or inactive. The tongue, at first moist and normal or covered with a whitish fur, became dry, hard and swollen; the bowels constipated; the pulse

small and slow and the respiration labored, with profuse diaphoresis before death. Sometimes the severe symptoms intermitted for twelve or twenty-four hours, suggesting the hope of a favorable issue, but suddenly a relapse occurred which ended in death. The first symptom which attracted attention appeared to indicate not the commencement of the disease but its maturity. In cases that ended fatally in from ten to fifteen hours lymph was effused largely in the pia mater. Dr. S. C. YOUNG, P. A. C. S., was cited as having known of no recovery in thirty-five cases that came under his observation when the disease prevailed in Grenada, Miss., in the winter of 1863–64. None of Dr. MOSES'S cases lived through the fifth day. He does not state their number, but gives notes of four as typical of the others. These are abstracted as follows:

1. Alec, a slave; age 25; was admitted March 24, 1864, at 10 A. M., having felt somewhat unwell on the previous day. There was some congestion of the left lung and rigidity of the posterior cervical muscles. A purgative of calomel and jalap was prescribed, but he refused to take it; wet cups were applied to the chest and the cold douche to the head, the latter used continuously for half an hour at a time every alternate half hour; one drachm of whiskey was given every half hour. At 1 P. M. he became noisily delirious and was restrained in bed with difficulty. At 5 P. M. the pupils were largely dilated and inactive; the patient passed his urine involuntarily and cried as if suffering; pulse 80, irregular, soft and quick; respiration 28. Next day he was comatose; pupils contracted; skin perspiring; pulse 110, fuller and softer; respiration somewhat quicker. He died at 6.30 A. M. of the 26th. *Post-mortem* examination: The vessels of the cerebral meninges were much congested, very tortuous and surrounded with exuded lymph; the base of the brain was coated with lymph and pus and the ventricles contained turbid serum; the spinal cord posteriorly was covered with exudation.

2. Henry, a slave; age 25; was admitted at 9 P. M., March 9, 1864, having had a chill before entering. Until 4 P. M. of the 12th pain in the head was so intense that the patient had to be removed to a detached room on account of his groans and outcries. As coma supervened the pupils became dilated and almost inactive. Death occurred at 4 A. M. of the 14th. He was treated with five grains of iodide of potassium every hour, and towards the end the scalp was blistered and stimulants administered. *Post-mortem* examination: Pacchionian bodies enlarged; deposits of lymph between the arachnoid and pia mater; lymph and pus at the base of the brain; substance of the cerebellum reddened and slightly softened superficially.

3. John, a slave; age 28; was sick for two days with a profuse and frequent diarrhœa before admission at 5 P. M., March 19, 1864, when his bowels were quiet, tongue dry and covered in the centre with a white fur; skin natural; pulse 148, small and soft; pupils contracted and motionless; he complained of pain in the head, neck and extremities, particularly in the arms. Half an ounce of whiskey every hour constituted the only treatment. He died twenty-four hours after admission. *Post-mortem* examination: The dura mater in several places near the Pacchionian bodies adhered to the visceral arachnoid; lymph was found in the course of the meningeal vessels and posterior to the optic commissure; the spinal cord was healthy.

4. The patient was admitted Feb. 24, 1864, with symptoms of pneumonia, but in twenty-four hours indications of meningitis were developed and death occurred on the fifth day. The peculiarity of this case consisted of the enlargement of the contracted pupils on exposure to light. The usual *post-mortem* appearances were discovered.

The article written by Dr. MOSES led Surgeon P. GERVAIS ROBINSON, P. A. C. S., to publish an account of four cases which occurred in the 22d N. C. in the winter of 1862–63, while encamped on the Rappahannock near Fredericksburg, Va. The soldiers attacked were members of the same company; three were conscripts and had been in camp but little more than a month; the fourth was a veteran. Of the conscripts two were brothers and the third their brother-in-law. The veteran only recovered:

1. The patient complained at first of a persistent dull headache, the only other symptom being a constipated condition of the bowels. On the fifth day he became profoundly comatose and died. Croton oil overcame the constipation; blisters over the spine and cold applications to the head had no evident influence on the course of the disease. *Post-mortem* examination: The surface of the brain was much and generally injected, and there was an extensive effusion beneath the arachnoid with occasionally coagulated patches of a yellow color, particularly along the longitudinal sinus, at the base of the brain and the commencement of the cord. No effusion was found in the ventricles, nor did the substance of the brain present any sign of having participated in the inflammation.

2. On the day the first soldier died his brother complained of dull headache and in the evening became violently and suddenly delirious, requiring the aid of several men to restrain him. The more violent paroxysms were controlled by the cold douche to the head, and by the continued application of cold cloths delirium subsided and reason was restored. The bowels were moved by croton oil and blisters were applied to the spine. During this period of intermission the patient was tranquil, partaking of such light nourishment as could be procured in camp; the pulse, tongue and skin were normal, and perhaps the only appreciable signs of a brain lesion were exhibited in paralysis of the sensory roots of the fifth pair and an unnatural acuteness of hearing. Towards the end of the fifth day the pupils became dilated and the patient comatose until death occurred, about the seventh day. *Post-mortem* examination: The lymphy exudations were more extensive than in the first case and the injection of the meningeal vessels greater; the lateral ventricles were distended with liquid.

3. The case of the brother-in-law followed closely on the second. In this headache was succeeded by maniacal delirium, after which there was a period of deceptive intermission. Deafness was observed on the third day; collapse and coma supervened about the sixth; death occurred on the ninth. Small doses of calomel were given until a gentle ptyalism was developed; stimulants were administered during the intermission and stimulating enemata in the last stage, but without apparent benefit. The *post-mortem* appearances were similar to those in the second case.

4. Before the termination of the third case the veteran was taken with headache succeeded by delirium less violent than in the two cases immediately preceding. This subsided in the course of thirty-six hours, and although

the pain in the head continued for some days the patient gradually improved until about the sixth or seventh day, when convalescence was fairly established.

Dr. Austin Flint has published two reports from the files of the Surgeon-General's Office, U. S. A., which, with two cases recorded by himself and the papers already presented, constitute the main portion of the fragmentary records of cerebro-spinal fever preserved by the medical officers of the Confederacy.

W. D. Mitchell, Senior Surgeon, *Illness & Deaths*, Feb. 1, 1863.—The following case is one of six fatal cases which have occurred in my regiment, all similar in the symptoms, with a few trifling and unimportant variations. It is well to remark that in every instance the subjects have been robust, healthy men and in the prime of life:

Sergeant A. Gennett, 3d Ala.; age 28 years, full and robust; was taken on the morning of the 5th of January with a severe chill attended with vomiting and pains in the abdomen; the bowels were constipated: he suffered during the day with severe headache and pains in the back and neck: the feeling of chilliness continued: he was perfectly sensible during the day, talked to his friends in a natural manner and partook of food in the shape of soup at the dinner hour: he continued in this condition until about 10 P. M., when a convulsion caused his messmates to call me to see him: they had up to this time considered his case as one of chill and fever and paid but little attention to the matter: this convulsion, which they described as exceedingly violent and of nearly a half-hour's duration, was the first symptom to excite their fears. On arriving at his tent I found him in a condition resembling the collapse of cholera. Asiatica: could be aroused when spoken to in a loud voice or when shaken, but his answers were not very intelligible: surface of body cold and covered with bluish-red patches such as are seen in hemorrhagica purpura. There was not at this time any symptom of either paralysis or tetanus: the pulse was full but very slow, the pupils contracted but responding readily to the action of light: respiration was labored, and there was a constant flow from the mouth of a yellowish slightly fetid fluid. This condition continued without the appearance of other symptoms until about 1 A. M., when a species of reaction ensued, severe and entirely uncontrollable. Expecting this from the condition of the pulse upon my first examination, I had made the attempt, notwithstanding the appearance of collapse, thinking that the condition of the pulse warranted me in this, to lessen the quantity of blood by opening the temporal artery, but the blood refused to flow, as it did also from the arm. Convulsion, or, more properly, spasm after spasm in rapid succession ensued. The efforts at respiration became painful to the beholder: muttering delirium followed after about two hours' duration of this condition: the intestines had remained cold during the whole of this time; respiration became less labored: the pulse was now fast and thready. At 8 o'clock next morning I found the patient fast sinking: the mutterings had ceased, respiration was slow but not labored, the pulse very fast but scarcely perceptible, the pupils permanently dilated and not responding to the action of light, the sphincters relaxed, the entire surface of the body cold and the spots before spoken of very much increased. With these symptoms gradually increasing **the patient died at 9 A. M.**

Dr. Mitchell was inclined to consider his cases related to typhus. The other report is by Surgeon J. T. Banks, 13th Ga., Fredericksburg, Va., March 28, 1863.

Dr. Banks does not state the number of his cases, but gives the particulars of his fifth case as illustrative of the whole. All, he says, were young, healthy soldiers: three or four of them careless of protection, confident in their **physical endurance and all inured to camp life: ages from 19 to 27 years.**

Thompson, of Co. F; age 24; fair well and a full supper on March 13, 1863, but complained of feeling badly at bedtime. During the night he had a chill and vomited his supper. At 4 A. M. the chill passed off: pulse 100, large, soft, compressible; skin warm; face flushed, with a slight purple tinge; eyes injected and watery; pupils normal; expression dull and dejected; tongue coated white and moist; bowels easy; mind clear; respiration of a moaning character, but **without cough, and full and easy when engaged in conversation. He complained of intense and unbearable** pain in his legs and begged for something to relieve it. Three grains each of calomel and ipecacuanha, with half a grain of opium, were given, and at 6 A. M., his condition being unchanged, two ounces of blood were drawn by cups from the **nape of the neck. An emetic of ipecacuanha and warm water given at this time brought up nothing but a** little glairy mucus. **An hour later the purple tinge in his face was deepened and the circulation depressed.** Mustard was applied along the spine and irritating, four grains, compound pill of squill, of each six grains, and calomel, three grains, were prescribed per administration hourly. At noon there was no pulsation at the wrist; nevertheless the patient was able to rise from his bed and walk about, aided by two comrades. Morphia was added to the treatment, but the pain continued unrelieved. **Towards evening the extremities became cold and the flush on the face changed** to a mottled purple hue. **He died at 11 P. M., his mind clear to the last.** *Post-mortem* **examination: Body in good** condition; skin discolored by extravasation of blood. **The arachnoid was somewhat cloudy and had three small,** well-defined, opaque spots over the upper part of the left cerebral hemisphere. **The veins were engorged, but there** was no effusion in the ventricles and the brain-matter was of natural color and consistence. **The condition of the** spinal cord is not stated. **The only notable appearances in the abdomen consisted of slight injection of the small** intestine, enlargement of the spleen to double its usual size and great distention of the gall-bladder by yellow healthy-looking bile. The lower half of the right lung was engorged and its lower border coated with plastic lymph: its upper half and the left lung were healthy. **The pericardium was normal; the heart contained firm fibrinous clots** in all its cavities closely interwoven with the valves; the veins emptying into the heart were full of fluid blood.

Although at the time the ground was covered with snow Dr. Banks was inclined to

consider his cases congestive malarial fevers, as remittents and intermittents had been common in his regiment all the winter. He did not regard the meningeal lesion sufficient to account for death, while the course of the disease negatived the idea of typhus.

Dr. JONES's cases were two of six which occurred at Augusta, Ga., early in 1865, in the 3d Ga. This regiment was encamped in a valley; regiments occupying the neighboring hills were unaffected. All the cases ended fatally. The symptoms were nausea, vomiting, diarrhœa and convulsions followed by severe pain in the head, extending along the spine, alternate contraction and dilatation of the pupils, low muttering, spasms, delirium and coma.

CASE 1.—Private Goosby was taken, February 12, with soreness in the chest and cough, pain in the head and back, nausea and slight diarrhœa. As the liver was enlarged and tender, a blister was applied to relieve the engorgement. On the 14th delirium set in with uncontrollable restlessness and loud cries. In lucid intervals the patient complained of violent pain in the head. A blister was applied to the back of the head and neck, ten ounces of blood were abstracted and quinine freely administered at intervals, but the disease progressed steadily, the prominent symptoms being muttering delirium, contraction of the pupils, deafness, rigidity of the muscles of the neck and spine, slow pulse, impeded respiration and torpid bowels. Death occurred on the 25th. *Post-mortem* examination eight hours after death: Dura mater normal; arachnoid opalescent over the sulci; pia mater congested and the larger veins and many of the arteries distended with dark-colored blood. The parts at the base of the brain and the spinal cord were coated with a firm, light, greenish-yellow, wax-like fibrinous exudation of considerable thickness. Large tracts of the cerebrum, cerebellum, the cauda equina and most of the roots of the spinal nerves were also coated, but the deposit on these parts was thinner and less consistent than at the base of the brain or on the cord, and in many places it required close inspection of the pia mater for its discovery. The third and lateral ventricles were distended with a light greenish-yellow, semi-fluid, pus-like matter, and their walls were coated with a layer of semi-organized plastic lymph. Under the microscope the layers of exudation resembled the lymph thrown out in mechanical injuries and acute inflammations; the liquid exudation of the ventricles consisted of a serous fluid containing numerous exudation cells similar to those of ordinary inflammatory processes, together with free nuclei and granules in considerable numbers. No exudation was observed on the free surface of the arachnoid. The right lobe of the liver was congested and dark-colored, its under surface slate-colored; the spleen was somewhat larger and softer than usual. The mucous membrane of the stomach was congested and ecchymosed in spots; that of the intestinal canal, particularly of the lower part of the ileum, was also somewhat congested, but the glands were apparently normal.

CASE 2.—Private H. Powell; age 20; was brought to hospital at noon March 12, having been taken sick during the previous night. His head was thrown back and he cried out in agony when disturbed from this position; pulse 90, small and quick; eyes slightly crossed; pupils dilated but mobile; hearing impaired; mind stupefied, but he put out his tongue when desired to do so. On the 16th he became very deaf and was unable to articulate. Death on the 17th was preceded by labored breathing and profuse perspiration. *Post-mortem* examination: The cerebro-spinal membranes were congested, their veins distended with black blood, the cavity of the arachnoid filled with serum. The base of the brain was covered with lymph and the ventricles contained liquid effusion. The cord was coated with lymph nearly one-fourth of an inch thick on the posterior aspect but thinner in front.

AMONG THE PRISONERS.—The records present nothing definite with regard to the occurrence of cerebro-spinal fever among the prisoners on either side. Probably the disease was relatively more frequent among them than among the troops on service. The patients in several of the cases given above were received from the guard-house or prison. Unfortunately the prison reports do not intimate the existence of cerebro-spinal fever or meningitis; they show, however, a larger death-rate from hyperæmic conditions of the cerebro-spinal system than those of the white troops generally: In the nine prison depots already described there were 160 deaths reported as from inflammation of the brain, of its membranes and of the spinal cord. This is equal to an annual death-rate of 1.96 per 1,000 men; but the corresponding rate among our white troops was only .93 per 1,000.

II.—SYMPTOMATOLOGY AND PATHOLOGICAL ANATOMY.

The clinical histories of the one hundred and five cases preserved by our medical officers necessarily present some variety, as their course extended from five and a half hours to more than that number of weeks. A better understanding of the character of these cases may be obtained by disregarding for the moment the extreme cases while studying those of mean

or average duration. The phenomena of the simple forms of these consisted of a chill followed by more or less reaction, during which intense headache and restlessness eventuated in delirium, coma and death, the process occupying from three to ten days. To these symptoms in the more complicated cases were added pain in some part of the spine, extending thence occasionally to the extremities, tetanic spasms and paralysis; and these phenomena were associated or not with the appearance of petechiæ or purpuric spots or blotches on the general surface.

The first-mentioned series includes cases 43, 45, 46 and 100, with their hemorrhagic blotches;
And cases 5, 21, 29, 31, 33 and 54, in which no spots were recorded.
The second series comprises cases 9, 12, 53, 83, 84, 87, 90 and 105, which were variously spotted,
And cases 16, 30, 34, 38, 55, 57, 65, 66, 67, 72, 74, 77, 89 and 103, which were free from spots so far as appears from the record.

The initiatory chill in these thirty-two cases was usually distinctly marked, although in 16 it is said to have been slight, while in a few cases the record does not mention its occurrence, the attack having commenced apparently with headache, nausea and vomiting. In 67 the severity of the chill led the case to be regarded as one of congestive intermittent fever. The reaction in this instance was imperfect, for it is stated that a low form of cerebro-spinal meningitis was developed; usually, however, the reaction was of some intensity, the face becoming flushed, the eyes injected and watery, the skin hot and dry and the secretions diminished. Nausea and vomiting, generally of green biliary matter, as in 43, 45 and 90, were sometimes noted; in the first of these cases the vomiting was persistent. Exceptionally, as in 89, the ejecta contained lumbricoid worms, many others of which were afterwards found in the stomach and intestines. Intense pain was developed, usually in the occiput and back of the neck, but sometimes, as in 84, in the forehead and temples; in 105 the pain extended down the spine and in 72 over the body generally. On the other hand, in 100 there was no headache, the distressing pain being confined to the lumbar region. The pulse was frequently quick and full; in a few instances it was characterized as hard; in a few also it was rapid and almost imperceptible.

As reaction was established the tongue from being moist and clean, or more or less furred, was observed in 9, 83, 84, 105 and others to become dry, red and afterwards dark-colored, while sordes appeared on the teeth and gums. The increasing pain was generally associated with delirious restlessness, moaning, outcries or incoherent talk the patient tossing himself from side to side of the bed or so persistently endeavoring to get up that men had to be constantly on guard to restrain him. In one case, 84, the delirium is said to have been of a humorous character. The pupils were natural or contracted. Sometimes also retention of urine added to the distress of the patient at this stage; in 105 delirium and restlessness were certainly in part due to the suffering from this cause. Jactitation was in many cases modified by tonic spasms, generally of the extensors of the head, the patient lying on his back with his knees drawn up, his head thrown back and the cervical muscles rigid; in case 12 the facial muscles were involved and the patient squinted; in 53 contraction of the flexors of the right side was followed by their paralysis; in 66, also, the right side was paralyzed; in 83 and 84 the patients reeled and staggered when roused from their delirium and placed upon their feet; and in 30 this staggering gait was followed by paraplegia. Sometimes, as in 43, there was hyperæsthesia of the general surface.

Delirium continued for an uncertain period, but ultimately the patient became less violent, noisy or restless, and was aroused to consciousness with increased difficulty. In some

as 72, the tetanic spasms persisted notwithstanding the deepening coma, but generally these subsided as the pupils became dilated, the pulse softer, fuller and weaker, the skin cool and covered with moisture, the breathing labored and the stupor profound; involuntary passages were common during this period.

The presence or absence of purpuric spots appeared to exercise no influence on the progress of the disease. These generally appeared during the stage of delirium. They consisted of purplish-red spots of various sizes, usually from one-eighth to three-eighths of an inch in diameter, although sometimes larger originally or by coalescence. They persisted under pressure and were in some instances slightly elevated. Certain regions of the surface were specially affected in individual cases but not in the aggregate. A few indistinct spots were observed on the loins in case 90. Usually, however, they were scattered over the surface, sparsely as in 83, but generally closely set and more numerous on some parts than others, as on the limbs in 9; on the lower extremities and especially in the vicinity of the joints in 83; on the chest and abdomen in 45. In 100, besides the petechial spots, a dark rash, disappearing under pressure, is said to have been present, and in 53 some pink spots were noted in addition to the dark-colored blotches.

The *post-mortem* appearances of the cerebro-spinal axis were very similar in all these cases. A hyperæmic condition of the pia mater constituted the anatomical or local essential, and on this depended certain secondary changes in the subarachnoid spaces and ventricles. The vessels underlying the visceral arachnoid were engorged with black fluid blood. Serum was sometimes noted, as in 105, at the base of the brain and in the membranes of the cord, but the characteristic lesion appeared to be the exudation of a yellowish or greenish lymph or pus beneath the arachnoid, apparently thickening that membrane and destroying its transparency throughout more or less of its extent. The parts most frequently and extensively affected by the deposit were the base of the brain, the pons Varolii, cerebellum, medulla oblongata, the spinal cord and the sulci between the convolutions of the cerebral hemispheres. The deposit was tough, fibrinous and oftentimes two or three lines in thickness, or it was soft and semi-purulent. With the exception of cases 57 and 100, which will be referred to particularly hereafter, and 12, which was not examined after death, it was present in all the above-mentioned cases, always at the base of the brain, frequently in the sulci and sometimes over the surface of the convolutions. In some instances the condition of the pia mater of the cord is not stated, probably because it was not examined. In others the cord is said to have been coated with this plastic or semi-purulent deposit, sometimes uniformly, as in 90, at other times chiefly on its posterior aspect, as in 55 and 87; while in some cases, as 45, the membranes are said to have been infiltrated with pus. But in certain cases, as 34, it is definitely stated that although the membranes of the cord were congested there was no exudation on its surface, and in 74 there appears to have been not even congestion. The serous surface of the arachnoid was unaffected except in two cases—13, in which the cavity contained effusion, and 83, which presented some recent adhesions between the visceral and parietal layers. The ventricles usually contained a turbid effusion or serum with a semi-purulent deposit, while their walls were coated with yellowish lymph. In some of the spotted cases, as in 43, 45, 87 and 105, the effused serum was tinged with blood, but in others it was turbid or purulent, as in the unspotted cases, and while in 16, a spotted case, there was no serum in the ventricles, in 67, an unspotted case, these cavities were unusually dry. The exceptional cases, 57 and 100, presented no positive sign of inflammation of the mem-

branes, although more or less congestion was present. The former was characterized by stupor and spasms, and typhus or fulminant typhoid, as in 58, 59 and 63, to be instanced hereafter, was not wholly excluded in the diagnosis. The symptoms in the latter pointed to a spinal meningitis; but although the pia mater was engorged and serum effused into the subarachnoid space no mention is made of the characteristic deposits of lymph and pus; the blood, which was liquid and dark-colored, formed ecchymosed spots on the viscera of the thorax and abdomen, as in case 28, to be mentioned hereafter.

The substance of the brain was not uniformly affected. In some its condition was not stated, in others it was recorded healthy. In 84 it presented dark-colored puncta; in 54 and 55 it was congested; in 45, 46, 89 and 103 congested and softened. In 34 the cerebellum was considered pultaceous; in 72 it was soft and its gray matter almost as pale as its white substance; in the former case the cord was congested, in the latter softened. The cord was also soft in 83 and 90, a section of its lower part in the last-mentioned case having given issue to a greenish liquid.

The anatomical appearances of the thoracic and abdominal viscera were inconstant, and hence more or less accidental. They are omitted at this time to permit of the uninterrupted study of the symptoms and meningeal lesions of the remainder of the one hundred and five cases presented as cerebro-spinal fever.

Twenty of these cases ran a more rapid course, ending fatally in a few hours or in a day or two after the development of the disease.

Ten of them were maculated, 13, 14, 27, 28, 49, 50, 62, 86, 92 and 99;
The remainder, 4, 8, 24, 47, 80, 91, 93, 95, 102 and 104, so far as appears from the records, were free from spots.

Neither the symptoms nor the *post-mortem* appearances of these cases presented the uniformity observed in the cases already discussed. Some, however, were characterized by a sequence of symptoms similar to that noted in the cases of longer duration. In cases 8, 13, 24, 27, 47, 80, 92, 95 and 102 the short history of the fatal attack embraced chills, fever, headache, delirium and coma, with or without spasms or paralysis, or the defective record shows only the sudden development of fatal coma with or without convulsive seizures; and in all these cases the characteristic deposits of lymph or pus were observed under the arachnoid. In 102 the purulent deposits were confined to the spinal cord, the cerebral pia mater having been congested merely.

But in the two cases, 24 and 92, the exudation appears only to have clouded the membrane, and instead of a purulent infiltration of the pia mater and subarachnoid tissue the cerebro-spinal fluid was generally clear, being turbid only in the lower part of the cord. These cases, anatomically considered, form the only links of connection between the few cases that presented simple engorgement of the vessels with perhaps serous effusion and the many that were characterized by well-defined inflammatory products. In 4, 91, 99 and 104 the meningeal vessels and sinuses were filled with dark-colored fluid blood, but no deposits of lymph or pus were present. These may be regarded either as cases of malarial congestion or of cerebro-spinal fever in which death anticipated the development of the local lesion, as in typhoid fever it may anticipate the ulceration of the glands or even in fulminant cases their enlargement. In 91 a healthy man was seized with an agonizing pain between the shoulder blades and, after paroxysmal recurrences of the pain, died suddenly five and a half hours after the first attack. In 4 a sequence of headache, chill and perspiration was followed by coma, trismus and death within thirty hours of the seizure. In 99 death took place from collapse after

twenty-four hours of fever, delirium, headache, maculæ and nervous prostration. In 104 chill, fever and perspiration were followed by a recurrence of the chill and fever with delirium, opisthotonos, trismus and coma.

It is perhaps as impossible to discriminate between these cases and cases of pernicious malarial fever as it is to determine the etiology from the symptoms alone in cases 49, 50, 86 and 93, which were not examined after death. A diagnosis of cerebro-spinal fever or malarial congestion, in cases where only meningeal congestion is present, involves a determination of the cause, if there be, indeed, two separate and distinct diseases manifesting themselves by this condition of the cerebro-spinal membranes. In 50 and 86 analogy would anticipate the presence of inflammatory products in the pia mater; the symptoms in the former were headache, chill, irregular blotches, dulness of mind, coma, profuse perspiration and death in about fifty-one hours; in the latter, pain in the head and neck, restless delirium, petechiæ, an anæsthetized condition of the skin, contraction of the posterior cervical muscles and coma, with death at the end of two days. Case 49 was probably congestive; it was characterized by a severe and long-continued chill, petechiæ and coalescing purpuric spots with coma following, and death within thirty hours. The record of 93 is, on the other hand, suggestive of typhoid fever in its virulent form: Debility and slight mental aberration, fever and headache lasting for several days, ultimately mild delirium, stupor and death forty-eight hours after admission to hospital but an uncertain number of days after seizure.

Three cases still remain for remark—14, 28 and 62. The nervous symptoms in the last are notably unlike those associated with undoubted cerebro-spinal inflammation; and typhoid fever is by no means contraindicated by the *post-mortem* observations,—the membranes of the brain finely congested and the patches of Peyer distinct, hard to the feel and black-pointed. Case 14 is of interest, inasmuch as it occurred in an epidemic of spotted fever attended with the exudation of products of inflammation within the cranium and spinal canal, and was regarded by the attending medical officers as a case of the prevailing disease. Nevertheless it presented but little congestion of the cerebro-spinal membranes, although the arachnoid was slightly opaque; it ended in collapse, not in coma, and the fatal lesion was developed in the serous lining of the pericardium instead of in the membranes of the nervous centres. The pericardium contained six or eight ounces of sero-purulent liquid with large masses of flocculent lymph, and its surface was covered with a layer of lymph membranous in tenacity and thickness. The connection of pericarditis with a diseased condition of the blood, as in rheumatic fever, albuminuria, etc., and its infrequency as a spontaneous idiopathic affection, argue that in the present instance it was due to a blood-poison, and in view of the nature of the cases then prevailing at New Berne, where it occurred, to the same blood poison that in other instances educed inflammatory results in the cerebro-spinal membranes.

The following case illustrates the association of pericarditic lesions with a clinical history suggestive of cerebro-spinal meningitis:

Private John Buchanan, Co. L, 15th N. Y. Cav., was admitted Feb. 12, 1864, with headache, severe pain in the back, nausea and slight inflammation of the fauces. He was sent to a tent where eruptive diseases were treated. The tongue became heavily coated and the fever and headache increased; low delirium followed in a day or two, with an intense rigidity of the muscles of the neck, tympanitic abdomen and strangury. He died at midnight of the 15th. He was treated with blue-pill, Dover's powder, sweet spirit of nitre, ice to the head, catheterism, wine-whey and milk-punch. *Post-mortem* examination: The anterior and lower part of the right lung was congested. The pericardium contained an ounce of sero-purulent liquid and a small deposit of fibrin on the surface of the heart. The peritoneum was slightly congested: the intestines distended with gas: the gall-bladder large: the urinary bladder distended and its mucous surface congested.—*Act. Ass't Surg. John Goldsborough, Hospital, Frederick, Md.*

Case 28 is of equal interest, but from another point of view. Agonizing pain in the back was associated with purple spots on the skin, an oozing of blood into the mouth, giving a sweetish taste to everything, and a blood-color in the urine. These symptoms were followed by high fever, violent delirium, coma and death. At the *post-mortem* examination the brain was found to be healthy. The spinal cord unfortunately does not appear to have been examined. All the other organs of the body were covered with ecchymosed spots. On account of the uncertainty as to the condition of the spinal cord the presence of a spinal fever or meningitis, as anatomically distinct from the hyperæmia of a congestive case of malarial disease, cannot be determined. The coma and death in this case must be ascribed to the high febrile condition brought about by a deterioration of the blood analogous to that present in malarial hæmaturia or hemorrhagic malarial fever.* Case 100, already described, was of a similar character.

In the following case, submitted in this connection, the dissolution of the blood and its appearance in all the organs and secretions led to the diagnosis of purpura hemorrhagica. The mercurials which the patient had taken, although the cause of some of the symptoms enumerated, cannot be held responsible for the purpuric colorations, delirium and death.†

Corporal Joseph B. Grow, Co E, 3d Vt. Art'y; age 25; muscular; was admitted Jan. 16, 1865, having been attacked four days before with a severe chill, general pains, much thirst, nausea, vomiting and diarrhœa. On admission the vomiting and diarrhœa were reported as having abated; the patient had headache but no delirium; his eyes were darkly suffused and their lids œdematous; tongue moist, slightly coated, protruded with difficulty; gums sore and exsanguine; fauces swollen and inflamed; flow of saliva excessive; submaxillary and cervical glands enlarged and painful; he had also a profuse coryza, pain in the chest and cough with bloody sputa; his face, neck and breast were of a bright-red color, as if covered with a scarlatinal rash, which also appeared in patches on the lower part of the trunk and limbs; this coloration disappeared under pressure. Another eruption, scattered over the entire surface, and consisting of bright-red spots varying from the size of a pinhead to that of a three-cent piece, persisted under pressure. The patient had been suffering for five months from syphilis, for which he had taken mercury. A saline cathartic was given and Dover's powder at night. He vomited the cathartic, passed a restless night, and next morning was found with all his symptoms aggravated,—thirst, glandular swelling and conjunctival congestion increased, scarlet efflorescence spreading and persisting, spots more numerous and larger; he had also severe pain in the head and loins; his stomach was irritable and his bowels unmoved. On the 18th the skin was of a dark-purple color, unaffected by pressure save in a few places; blood oozed from the gums and fauces and was mingled with the expectoration, saliva and tears: the urine was dark-colored from venous blood; the patient was delirious; pulse 100 and soft. Tincture of iron and whiskey were given at intervals during the day; in the evening a natural-looking stool was obtained by an enema of castor oil and turpentine; chlorate and permanganate of potash were also added to the treatment. The delirium increased, the pulse became rapid and weak and the secretions continued, mixed with blood, until death took place on the evening of the 19th. *Post-mortem* examination: Rigor mortis well marked; surface covered with a coalescence of purpuric spots which, on the thighs, had become greenish-black in color and were roughly elevated, the lachrymal sacs were filled with dark fluid blood; the conjunctival membranes were congested and projected between the half-open lids. The mucous covering of the mouth, tongue, gums, fauces and œsophagus was pale except where spotted with purpuric extravasations. The pericardium showed on its anterior surface a semitransparent, gelatinous mass the size of a lemon; the heart was covered with purpuric spots; both ventricles contained well-washed clots. The lungs were congested and spotted, as were the costal pleuræ; the bronchial tubes were filled with bloody froth. The stomach contained eight ounces of dark coffee-colored liquid; its submucous tissue was colored with coalescing ecchymoses. The intestines were in the same condition as the œsophagus and the peritoneum was similarly spotted. The omentum was contracted and of a deep straw-color and the mesenteric glands distended with dark venous blood, which flowed freely on incision. The liver, weighing six pounds and a half, was covered with large purpuric spots, and presented on its under surface several ash-colored patches about an inch square, which extended a quarter of an inch into the substance of the organ; the gall-bladder was distended and contiguous organs were tinged with a dark-green color: the spleen was spotted externally and congested. The connective tissue around the kidneys was filled with blood: the pelves and tubuli were distended with coagulated

* [illegible]

† W. S. [illegible], Mobile, Ala., in describing an epidemic of cerebro-spinal meningitis which occurred in that city,—*Atlanta Medical and Surgical Journal*, June, 1866,—gives the case of a soldier suffering from mercurial ptyalism, which is in strong contrast with that submitted in the text. On Feb. [illegible], when the patient was admitted, his skin was yellow and he had vomited bile several times; his tongue was swollen and ulcerated and he suffered [illegible] pain in the forehead and temples. On the 7th he had severe pain in the head and his mind wandered. Next day the pain was more intense and attended with [illegible] pressure; he complained of pain in the neck when his head was moved. Delirium continued, the pupils became [illegible], the pulse [illegible]. The patient refused nourishment and picked at the bed-clothes. He died on the 11th. No *post-mortem* examination was held. Neither petechiæ nor purpuric extravasations are mentioned as having been observed during this epidemic.

blood: the ureters showed purpuric spots on their mucous surfaces; the bladder, which was filled with bloody urine, had its mucous coat covered with small scarlet spots, those around the neck of the organ being arranged in a stellate form.—*Hospital, Second Division, Sixth Army Corps.*

In the series of one hundred and five recorded cases twenty-eight of those which had a fatal issue were protracted in their duration from ten days to three months.

Only seven of these were maculated, 7, 15, 25, 41, 58, 60 and 63, and in none were the spots so profuse as in the more rapidly fatal cases.

The others, 2, 3, 6, 11, 18, 20, 35, 36, 37, 39, 42, 44, 51, 52, 59, 61, 64, 78, 88, 94 and 101, were unspotted so far as is shown by the records.

The characteristic symptoms of an implication of the cerebro-spinal membranes were present in many of these. In eleven, viz: 7, 35, 36, 41, 42, 44, 64, 78, 88, 94 and 101, the delayed issue was due to a prolongation of the febrile or delirious period, but in 2, 18 and 25 the increased duration of the attack was the result of a temporary amelioration of the symptoms. In 2 the improvement continued for three weeks, the excitement abating and the patient becoming able to sit up and give generally rational answers; but at the end of this time he grew worse suddenly and died. In 18 the delirium and rigidity of the posterior cervical muscles following the initiatory chilliness subsided at the end of two weeks, but ten days later the spasms returned gradually and continued until death. In 25 chill, fever and delirium were followed by unconsciousness, which by the eighth day had passed off, leaving the patient perfectly rational; the improvement lasted for two weeks, when continued fever of an adynamic type was developed; low delirium, floccitatio, bedsores, unconsciousness and stupor were successively manifested; pain in the back of the neck characterized the early period of this relapse, and a persistent backward tilting of the head its later period: an eruption appeared on the face and abdomen on the thirteenth day of the second seizure, and death occurred two days later. In all these cases *post-mortem* observation revealed the presence of meningeal congestion and of deposits of lymph and pus such as were found in the majority of the more speedily fatal cases.

No examination was made after death in cases 11, 20 and 51, but the clinical records favor the supposition that cerebro-spinal meningitis was present.

Identical inflammatory lesions were found also in cases 6, 15, 37, 39, 52 and 61, which, in their clinical aspects, differed considerably from the average or typical case of the disease. These cases in fact suggest that the cerebro-spinal inflammation originated in the deteriorated condition of the blood consequent on congestive malarial, typhoid or the eruptive fevers instead of on that due to a special and peculiar febrile poison. Seventeen days elapsed in case 6 between the occurrence of a congestive chill and the supervention of severe headache, febrile delirium and convergent strabismus, which ended in death five days afterwards. The only clinical statement in 52 is the diagnosis of typhoid fever, which, however, cannot be considered substantiated by the intestinal lesion, the injection of two of the patches of Peyer. But in 15 chill, headache, pain in the back and limbs, recurring epistaxis with febrile movement, cough, sibilant râles, sordes, diarrhœa, gurgling in the right iliac fossa, violent and afterwards muttering delirium, and the appearance of several undescribed spots on the eleventh day, with coma on the twelfth and death on the fourteenth, constitute a sequence of symptoms indicating a possibility of typhoid fever, which is by no means negatived by the enlargement of the solitary glands and the thickening and ulceration of the patches of Peyer, noted in the *post-mortem* record; occipital pain and the extended position of the head were the only symptoms pointing to the implication of the cerebral membranes.

The following report brings prominently into view the occurrence of cerebral cases in an epidemic of typhoid fever:

Act. Ass't Surgeon J. P. De Bruler, *August* 30, 1862.—Typhoid fever has been very prevalent in the hospitals of Evansville, Ind., and in many cases entirely unmanageable. Inflammations of the brain and its membranes prevailed, it seemed to me, to an unusual extent. Tenderness and gurgling in the right iliac region and diarrhœa occurred in a large majority of the cases. The rose-colored eruption was distinctly marked in over two-thirds of those affected. Petechiæ were observed in a number of cases; the tendency to purpura was so marked that the slightest friction, as of scratching, would be followed by ecchymoses. I may here add that scorbutic symptoms were common in all diseases associated with debility. In mild cases the treatment consisted of gentle diaphoretics and cooling refrigerants, with aperients, opiates or astringents, as seemed to be indicated, and a diet of barley-water, animal broths and boiled or thickened milk. When the bowels were prominently affected turpentine emulsion was very generally relied on, with turpentine applications to the abdominal surface; many other remedies were tried, but on the whole this seemed the most satisfactory. In another class of cases evidences of imperfect oxygenation of the blood were prominent: The skin was dark-red or livid all over the body, especially about the lips, gums and ears; pressure readily produced a white spot, but when the finger was removed the color was restored very slowly,—in a word, the capillary circulation was sluggish and the vessels engorged. The surface was often cool and the pulse frequent and feeble. In these cases stimulants were early resorted to and the results were often very satisfactory; porter, ale, wine and brandy were freely given. Indeed, I think that brandy given in large and frequently repeated doses was the means of saving a number of lives. Another remedy much valued in this variety of the disease was chlorate of potash—given in eight or ten-grain doses every four or five hours. We understand but little of its modus operandi, but it seems unquestionable that it does in some way assist in oxygenating the blood. In cases accompanied with inflammation of the brain there was often forced respiration. This was promptly and permanently relieved in so many cases by blistering the nape of the neck that something more than a coincidence is suggested.

Fourteen *post-mortem* examinations were made in fever cases. In nine there was well-marked ulceration of Peyer's glands, often extensive and in one perforating,—there was probably perforation in another case not examined;—in two the glands were enlarged and unusually distinct; and in three the ileum was unaffected, but in two of these the disease seemed to have spent its force upon the brain, having proved fatal in a comparatively short time, and in the third the immediate cause of death was an acute inflammation of the lungs.

Similar cerebral complications were developed in the progress of measles in cases 37 and 39; while Ass't Surgeon McGill, U. S. Army, regarded 61 as originally a case of modified variola, in the course of which, "under the cerebral type of disease prevailing, general cerebro-spinal meningitis supervened." Nevertheless, as this patient contracted his disease at Galloupe's Island, Boston Harbor, where measles and the so-called spotted fever were prevailing, the sloughing spots on the lower extremities are probably to be attributed to the same deteriorated condition of the blood that produced them in some of the cases recorded by Dr. Calvin G. Page at the station mentioned.*

In the remaining five of the protracted cases a fever was present which cannot be identified as cerebro-spinal by the lesions found after death. In 3 and 60 fever, delirium and a typhoid condition were associated with some injection of the membranes and cloudiness of the arachnoid, apparently not inconsistent with the presence of a continued malarial fever, as the spleen in both was large and the patches of Peyer conspicuous, marked with black points in one and slightly ulcerated in the other. The difficulty of discriminating between malarial and cerebro-spinal fever was, as may be seen by these instances, not confined to the congestive cases of the former. The following case of remittent fever would probably have been considered an example of cerebro-spinal fever had it occurred during the epidemic prevalence of that disease:

Private Joseph Barnes, 12th Ill.; age 25; was admitted Nov. 22, 1864, crying aloud from intense pain in the head and back. The pain continued unabated for several days, notwithstanding treatment by opiates, sinapisms to the back and feet, cups to the back and free movement of the bowels by castor oil. On the 29th it became less severe, but the tongue was dry and fissured, the eyes suffused and the mind wandering. A blister applied on the 30th to the back of the neck partially restored consciousness, but the delirium returned, the patient at times attempting to leave his bed and at other times being inclined to muttering delirium and stupor. He died comatose on December 8. *Post-mortem* examination: The skull-cap was remarkably thin. The membranes of the brain were somewhat congested and moister than usual. There was no evidence of inflammation about the base of the brain and the brain-substance

*See *supra*, page 583.

appeared healthy: but the lateral ventricles were distended with bloody serum and the floor of each was coated with white coagulated fibrin which extended into the cornua; a similar exudation was found in the other ventricles. The other organs were not examined.—*Act. Ass't Surg. H. C. May, Hospital No. 8, Nashville, Tenn.*

The three cases, 58, 59 and 63, occurred at the National hospital, Baltimore, Md., where, as already stated, the occasional presence of true typhus was suspected. In 58 a typhous condition, with muscular spasms drawing the head strongly backward, presented some congestion of the brain and its membranes, some opacity of the floor of the fourth ventricle and bloody serum in the cornua of the lateral ventricles. In 63 the patient, who was subject to intermittent fever, and had just recovered from pneumonia contracted while in hospital, suddenly developed typhous symptoms which proved fatal in six days without the occurrence of convulsions; slight injection of the brain and its membranes with two small extravasations of blood on the convexity of the hemispheres were observed in this case, with some congestion and ecchymosis of the mucous membrane of the alimentary canal and pigmentation of the patches of Peyer. The clinical history of 59 shows delirium and opisthotonos, while the *post-mortem* record reveals only congestion of the pia mater and lungs, enlargement of the spleen and pigmentation of the agminated glands.

In eighteen of the one hundred and five cases there is no clinical record, or the symptoms mentioned are insufficient to identify the disease. These are cases 10, 19, 22, 40, 56, 68–71, 73, 75, 76, 79, 81, 85 and 96–98; in only one of these cases, 73, is the existence of spots indicated.

A few of these were recorded as typhoid fever; but this view of their nature was not sustained by *post-mortem* observation except perhaps in 56, in which engorgement of the pia mater, congestion and ecchymosis of the mucous membranes, enlargement of the solitary and agminated glands and ulceration of the large intestine might be supposed to indicate a typho-malarial fever fatal in its early stage. In all the other cases the characteristic lesions of cerebro-spinal meningitis were discovered after death.

Four of the recoveries, 1, 17, 23 and 26, were reported during the New Berne epidemic, one, 32, from Chattanooga, Tenn., one, 48, from the Army of the Potomac, and one, 82, from Benton Barracks, Mo.; and in all the accuracy of the diagnosis appears to have been fairly established. The patient in 26 was returned to duty on the seventeenth day, and the only recorded symptoms were headache and pain in the back of the neck; in 23 the patient was returned to duty at the end of a month, having rallied from his stupor on the third day of the attack on the establishment of profuse salivation. In neither of these were the characteristic symptoms present, but the type of disease then and there prevailing warrants their acceptance as cases of cerebro-spinal fever in the absence of *post-mortem* testimony to the contrary. Petechial spots were observed in 48 and a wheal of large size on the anterior aspect of the trunk in 32; but case 1 is the only instance of recovery which was characterized by the early development of purpuric blotches,—they appeared on the arms and legs during the reaction from the chill; the patient was unconscious, but neither coma nor convulsions were developed; improvement was manifested by the return of consciousness on the fifth day; the spots sloughed instead of fading, and the cornea appears to have become opaque and greenish.* Case 17, although unspotted, was somewhat similar in its course; in both instances the men were discharged between three and four months after the attack. In 32 the onset was by chill, fever and headache, but the pain was most severe in the spinal cord and along the thighs; delirium and paralysis continued for two weeks, after

* Case 11 of the series reported from Galloupe's Island, Boston Harbor,—see page 583,—was of a similar character. There was neither opisthotonos nor cerebral disturbance, but the spots on the arms sloughed and a discharge exuded from beneath the crusts that formed on the legs; improvement dated from the sloughing, but vision was greatly impaired.

which recovery was gradually effected. In 48 headache, stupor, vomiting, involuntary passages, opisthotonos, hyperæsthesia of the surface, petechiæ, delirious moaning and complete deafness continued for about three weeks, and terminated in a gradual improvement; but deafness persisted and necessitated the discharge of the patient at the end of six months. In 82 a chill was followed by pain between the shoulders: two days later a congestive chill was experienced: reaction was not fully established until three days had elapsed: after which pain in the head and back, extreme sensitiveness of the surface, indications of paralysis of the lower extremities and fever of a typho-malarial type continued for three weeks before the occurrence of convalescence. A malarial element appears to have been recognized in this instance, as in 17, in which a chill at noon of one day was followed by violent delirium at the same hour of the following day.

Of the one hundred and five cases submitted, seven recovered and in eight no *post-mortem* examination was held. Of the ninety cases remaining seventy-five were identified as cerebro-spinal meningitis by the *post-mortem* appearances, while fifteen were characterized by more or less congestion of the cerebro-spinal membranes. Most of the seventy-five cases presented a certain sequence of symptoms of sudden development and comparatively rapid progress: but in a few cases, as 6, 15, 37, 39, 52 and 61, the disease supervened on a continued fever of malarial, typhoid or typhous origin or on an eruptive fever. Two cases, 24 and 92, appear as connecting links between the inflammatory and congestive cases. An uncertainty attaches to the fifteen cases in which positive evidence of inflammation was not observed: In some congestive or continued malarial fever, in some typhoid and in some typhus is suggested as a probability, instead of a specific febrile poison manifesting its presence in the system by cerebro-spinal congestion. One of these, 62, was probably a case of typhoid fever; one, 14, was a distinct pericarditis anatomically; four, 57, 58, 59 and 63, may have been typhus or fulminant typhoid; one, 56, typho-malarial; two, 3 and 60, continued malarial fever; two, 28 and 100, hemorrhagic malarial fever, and four, 4, 49, 99 and 104, congestive malarial fever.

SUMMARY OF THE POST-MORTEM APPEARANCES IN THE RECORDED CASES.

The LUNGS were more frequently the seat of morbid changes than any other organ or tissue excepting the cerebral membranes. **Reference is made to their condition in seventy-four of the ninety fatal cases the records of which have been preserved. In twenty of these they were healthy; in fifty-four altered. Generally, as in 5, 7, 35, 36, 39, 40, 54, 73, 81 and 87, one lung only was affected, but more frequently both were implicated in the congestions, extravasations and inflammatory changes that characterized the morbid anatomy. Congestion characterized the rapidly fatal cases; pneumonitic processes were more frequent in those that ran a protracted course.**

The condition of the pleural membranes is indicated in twenty-eight cases, in two of which it was normal: it was probably normal also in some other cases in which the lungs are said to have been healthy, the serous membrane remaining unmentioned. **Of the eighteen cases presenting morbid changes there were adhesions in 40, 43, 63, 68 and 97: in some of these the adhesions were old and unconnected with the fatal illness, but in the last-mentioned case commenced quite recently and was associated with an abscess in the spleen. In 39 and 91 there was effusion of serum; in 33, 35 and 36 exudation of lymph, and in 28, 55–58, 62, 64 and 100 ecchymoses.**

The HEART was normal in twenty-three cases, and in twenty others in which the contents are stated its condition did not appear to call for remark. **Morbid changes are mentioned in thirteen cases: In 4, 39, 85 and 105 the heart was softened, in 40 fatty, in 56 flaccid, in 70 and 77 fatty, in 64 dilated and dark-red, in 28 enlarged, in 45 anæmic and flaccid, in 49 flaccid and pericardium red and in 100 enlarged on the parietal cavity.** In thirty-four cases the cardiac contents are mentioned: **In 58 the heart is said to have been free from clots, in 4, 9, 35, 68 and 105 to have contained dark fluid blood, in 60 and 92 clots, in 56 and 59 mixed clots and in 70 and 90 fibrinous coagula.** Fibrinous deposits were observed in both sides in 5, 36, 39, 54, 57, 65, 73, 81, 84, 87 and 91, in the right side in 25, 26, 56, 62, 68, 85, 99 and 103, and in two of these, 26 and 62, the contents of the left side are described as uncoagulated blood and mixed clots, in the left side in 40, 70 and 97, the right side in the first containing coagulated blood and in the last mixed coagula.

The PERICARDIUM is said to have been **normal in two of seventeen cases in which its condition was noted. The sac contained an unstated quantity of serum in 46, 73 and 74, two ounces in 91, three in 5 and 40, four in 39 and**

eight in 35: in 105 the effused liquid was tinged with blood, and in 9, 14, 38, 43 and 103 there were definite indications of pericarditis; in 28 the serous membrane was ecchymosed.

The STOMACH was the subject of report in forty-two cases, in twenty-three of which it was normal. Congestion was noted in 5, 55, 61–64 and 85; ecchymoses in 28, 56, 58, 90 and 100; mottling in 57; softening in 74, 78 and 88: lumbricoid worms in 89, and inflation or distention in 36 and 99.

The condition of the SMALL INTESTINE, in whole or in part, is noted in sixty-eight cases, in twenty-seven of which it was normal and in one, 99, distended merely. In five cases, 3, 5, 9, 15 and 25, the condition of the intestinal glands only is stated. The bowel as a whole is reported more or less congested in 28, 33, 35, 36, 39, 40, 56, 58, 60 and 64; in 58 the congestion tended to form small irregular spots; in 35 there was also ulceration of the ileum and in 36 and 39 intussusception. Ecchymoses were present in 43, 46 and 100 and lumbricoid worms in 89. The duodenum was congested and of an ironed-out appearance in 63, and the duodenum and jejunum in 55 were similarly affected. Abnormal conditions in 38, 42, 54 and 62 were confined to the jejunum and ileum—in the first-mentioned case the jejunum was congested and the ileum contracted; in the second a lumbricoid worm in the jejunum was noted, with a thinned and congested state of the ileum; in 54 both divisions were reddened, and in 62 the upper was colored dark-red and the mucous folds of the lower thinned and blackened; in a fifth case, 57, the jejunum is said to have been yellowish and the ileum thinned, its aggregated glands tumid. The ileum alone is mentioned in fourteen cases: In 45 contracted; in 31, 59, 69, 104 and 105 congested, 59 presenting the shaven-beard appearance; in 78 softened, pigmented and the solitary glands enlarged; in 4 and 85 ulcerated, the solitary glands prominent in the latter; in 52 the agminated and solitary glands were injected and in 70 the crypts were inflamed; in 61 the mucous folds were thin and ironed-out, in 71 softened, and in 90 reddened, ecchymosed and softened.

The LARGE INTESTINE is referred to in fifty-seven cases; in thirty-two no notable change was reported; in fifteen of the remaining twenty-five cases the intestine as a whole is described: It was injected or congested in 36, 39, 40, 55, 60 and 61, discolored in 57, ecchymosed in 28, 43, 46 and 100, ulcerated in 33 and 56; its solitary follicles were inflamed in 70 and in 89 it contained lumbricoid worms. In ten cases morbid appearances are noted only in connection with one or two of the anatomical divisions of the bowel: The solitary follicles of the cæcum were prominent in 78; the colon was congested in 63, 64 and 73 and pigmented in 69; the cæcum and colon congested in 62 and 90, pigmented in the former, ecchymosed and with prominent follicles in the latter; the colon and rectum congested in 97; the lower part of the intestine congested in 58; the solitary follicles of the cæcum prominent and the mucous membrane of the rectum softened and pigmented in 85.

Besides the abnormity of the PATCHES OF PEYER and SOLITARY FOLLICLES in specified portions of the intestinal tract already noted in cases 52, 57, 70, 78, 85 and 90, the agminated glands were conspicuous or thickened in twelve cases, in four of which, 5, 56, 61 and 64, there was no other alteration, in one, 28, ecchymosis, in three, 3, 9 and 15, slight ulceration, and in four, 25, 60, 62 and 63, pigmentation; the solitary follicles were enlarged in 15, 28, 56 and 64.

The condition of the LIVER was reported in sixty-nine of the examinations. It was normal in twenty-seven and altered in forty-two cases: It was large in eight, 34, 35, 38, 40, 41, 75, 97 and 100; pale in two, 69 and 77; large and pale in three, 28, 71 and 72; fatty in five, 29, 78, 79, 85 and 90; large and fatty in two, 4 and 73; engorged in two, 42 and 55; congested in six, 7, 43, 53, 58, 63 and 104; large and congested in four, 3, 13, 27 and 39; large and mottled in two, 36 and 37; light, friable and odorous in 57; dark superficially in 44; dark, firm and odorous in 64; cirrhosed in the two cases 70 and 74, and dark and firm in the three cases 54, 56 and 62.

The GALL-BLADDER was distended in eleven cases, 25, 35, 38, 41, 42, 45, 46, 85, 99, 100 and 104; empty in 36, 37, 39 and 40. The bile, when specified, was generally dark-colored and frequently viscid, as in 25, 54, 55, 56, 58, 62, 63, 64, 78 and 99.

The state of the SPLEEN is reported in sixty-eight cases, in thirty-three of which it was healthy. Morbid changes are recorded in thirty-five cases: The organ was congested in four, 4, 8, 53 and 99; large and congested in three, 3, 13 and 27; large and soft in six, 9, 59, 62, 63, 73 and 97, with an abscess in the last-mentioned case. Enlargement is the only change recorded in the nine cases 35, 38, 41, 43, 45, 60, 68, 70 and 104; softening in two, 75 and 78. The spleen was large and firm in three, 28, 61 and 85; large, light-colored and friable in 55 and large, dark-colored and friable in 57. It was anæmic in 74 and small in the five cases 7, 46, 56, 72 and 77, light-colored in the first mentioned, hard in the last and dark and tough in 56.

The KIDNEYS were normal in thirty-nine cases, abnormal in twenty-three. They were enlarged in 4 and 39; ecchymosed in 28 and 100, each kidney weighing ten or eleven ounces; fatty in 29, 47, 69, 79 and 85; soft or flaccid in 56 and 97, and congested in 37, 53–55, 57–59, 62, 64, 91, 92 and 104.

The SUPRARENAL CAPSULES were reported normal in 57 and 61, enlarged and firm in 54, reddened in 58; the right capsule in 56 was distended with a bloody granular liquid.

The URINARY BLADDER was reported abnormal in two cases only, 45 and 28.—in the former inflamed, discolored and distended with decomposing urine, and in the latter ecchymosed; it was empty in 35 and distended in 38, 69, 72, 75 and 98. The URINE was reported albuminous in 29, 55, 58, 91, 92 and 99, healthy in 54 and not albuminous in 56.

The PANCREAS is said to have been normal in 15, 54, 61 and 63, pale in 28, reddened in 56, 57 and 90, congested in 55, friable and light-colored in 58, and large, congested and containing a calcareous deposit in 62.

The PERITONEUM was ecchymosed in 28 and 100 and inflamed in 31 and 41; the omentum was congested in 71 and 105 and the serous sac contained some effusion in 40 and 46.

The MESENTERIC GLANDS were enlarged in 36, 37, 45, 46, 57, 69, 71, 97 and 104, and in two of these, 57 and 71, they were dark-colored.

The BLOOD, besides having been dark and fluid in the heart-cavities in 4, 9, 35, 38, 68 and 69, was said to have been fluid generally in 54, 55, 56, 58, 90, 91, 92, 99, 100 and 105. It was dark, thin or fluid in four of the twenty rapid cases, 4, 19, 92 and 99; in seven of the thirty-two cases of medium duration, 9, 38, 54, 55, 90, 100 and 105; in two, 35 and 58, of the twenty-eight protracted cases, and in three of those in which the clinical record was insufficient to identify the disease, 56, 68 and 69. A similar condition was noted in seven of the twenty-nine spotted cases, 9, 58, 90, 92, 99, 100 and 105, and in cases 4, 35, 38, 54, 55 and 91 of the fifty-one unspotted cases.

PATHOLOGY.—The disease under consideration was sometimes spoken of as *spotted fever* and sometimes as *epidemic cerebro-spinal meningitis;* but neither title was applicable to all the cases that were aggregated under it. Some were free from maculæ and others, whether maculated or not, presented no evidence of inflammation of the membranes of the brain and spinal cord. Of course, if the inflammatory products that were found in the subarachnoid spaces of a majority of the cases be assumed to have been characteristic of the disease, all cases failing to present these appearances must be referred to congestive malarial fever, fulminant typhus, typhoid or other pernicious febrile cause, no matter how closely in their clinical aspects and etiological associations they may have resembled the accepted cases of so-called cerebro-spinal meningitis.* But there was no warrant for setting up an anatomical standard of this kind. Cases must be considered as they occurred, whether agreeing or failing to agree with preconceptions and arbitrary assumptions. Case 14 was as truly one of the disease then prevalent at New Berne, N. C., as any of the twenty-six other recorded cases; and yet there were no inflammatory products under the arachnoid, although such products were found in connection with the serous envelope of the heart. This case alone demonstrates that the disease was certainly not in its essence a cerebro-spinal meningitis nor even in all cases a cerebro-spinal fever. So also cases 28 and 100, in which the dark-colored and fluid blood escaped from the vessels, forming ecchymosed patches on the cutaneous, mucous and serous surfaces, must be regarded as true cases of spotted fever, although there was no evidence of the presence of cerebro-spinal meningitis. Some of the cases at Galloupe's Island were of a similar character, as No. 11 of Dr. PAGE's record,† in which the cutaneous blotches sloughed; and although in this case there was no opisthotonos or cerebral disturbance, its connection with a true cerebro-spinal meningitis is proved by case 61, from that station, which terminated fatally at the National hospital, Baltimore, Md. Dr. CROSBY's cases at Concord, N. H., were also specimens of the disease now under consideration, although his fifth case presented no *post-mortem* evidence of an inflammation of the cerebro-spinal membranes.

Two of the writers who have discussed the spotted-fever cases of the war concluded that their essential was an inflammation of the membranes of the brain and spinal cord.‡ Of course, in the army as in civil life, there no doubt occurred cases of idiopathic cerebro-spinal meningitis; cases unconnected with any primary blood-disorder.—in fact, BARTHOLOW regarded 32 and 78, already submitted, as of this character; but JONES and HUNT have thrown the whole of the spotted-fever cases into the idiopathic phlegmasiæ. They considered that the *post-mortem* examination of a typical case, that of Private Goosby, 3d Georgia militia,§ did not develop a single fact to justify the classification of this disease with the pyrexiæ. Both regarded the disorganization of the blood as a secondary result of derange-

* Thus, SANFORD B. HUNT, page 398 of the *Medical Memoirs, U. S. Sanitary Commission*, says of the case given *supra* as case 4, that *post-mortem* examination revealed no evidence of cerebro-spinal meningitis; and since he regarded the disease known as spotted fever, typhus syncopalis, etc., as a common phlegmasia of the cerebro-spinal membranes, this case was therefore to him not a case of the disease which prevailed at the time of its occurrence at New Berne.

† See *supra*, page 583.

‡ See JONES's *Medical and Surgical Memoirs*, pp. 411 *et seq.*, also *Cerebro-spinal Meningitis*, by SANFORD B. HUNT, *U. S. San. Com. Memoirs.*

§ See *supra*, page 590.

ment of the circulation and respiration induced by the disturbance and perversion of the cerebro-spinal functions,—and the discoloration of the skin was referred to irregular capillary action and congestion dependent on deranged nervous action and circulation.

It is unnecessary, perhaps, to point out to those who have examined the submitted cases, that the disorganization of the blood was not proportioned to the continuance of the inflammation or the amount of the inflammatory products, but rather to the rapidity of the progress of the cases; and that in several instances in which the presence of inflammation was not satisfactorily established the blood was as fluid and as dark as in those that, having persisted for a longer time, exhibited well-defined evidences of inflammation. It is equally manifest that the purpuric spots were not dependent on deranged nervous action, for they sometimes appeared during the initial chill and before symptoms of an inflammation of the membranes were recognized. They were more profuse, as a rule, in the rapid cases than in those of slower progress, although the latter presented a greater accumulation of the products of inflammation on the cerebro-spinal surfaces to derange the nervous system. Indeed, an investigation of the cases that have been submitted demonstrates that the danger was proportioned to the deterioration of the blood as shown by the presence of purpuric spots, for of twenty rapidly fatal cases one-half were maculated; of thirty-two cases fatal in from three to ten days three-eighths were maculated; of twenty-eight protracted fatal cases one-fourth were maculated, and of seven cases that did not terminate fatally two only were spotted. Moreover, while the spots in the rapid cases presented frequently the characters of ecchymotic blotches coalescing and covering the whole of the surface of the body, in the protracted cases they were more often minute and sparsely scattered over some particular region.

But if these spots were due to disordered capillary action resulting from meningeal inflammation they should be found in inflammations of traumatic origin. The symptoms of traumatic spinal meningitis are pain and tenderness in the affected part, often extending into the extremities, pyrexia, restlessness, cutaneous hyperæsthesia and paralytic tendencies; the posterior, cervical and dorsal muscles become rigid and the patient's head is curved backward; when the cerebral membranes are involved intense headache, restlessness and delirium are followed by coma and death, although occasionally death may be the result of the severity of the tetanic spasms. The anatomical conditions associated with these symptoms are identical with those found in the majority of the spotted fever cases,—plastic lymph on the surface of the brain and spinal cord, with accumulations of pyoid serum in the subarachnoid spaces. The identity of the symptoms in idiopathic and traumatic meningitis indicates that their inflammatory products exert a similar influence on the economy; but as the products of traumatic origin are not associated with ecchymotic blotches, the maculæ in the idiopathic cases must be due to some other cause than the inflammatory derangement of the nervous system.

On the other hand, where the blood is in a degenerated condition, whether slowly produced by defective alimentation, as in scurvy, more rapidly by the primary influence of a blood poison, abetted by the retention of the products of febrile waste, as in typhoid, typho-malarial and continued malarial fevers, or immediately by the pernicious influence of a virulent miasm, as in congestive malarial fevers and some cases of typhus, these ecchymoses appear not only on the cutaneous surface but on the mucous and serous surfaces.

The cases submitted in this chapter must therefore be regarded as due to a powerful fever cause acting primarily on the blood* like those of typhoid, typhus, the malarial and

* A committee of the American Medical Association reported on this point as follows. "In every case the blood was fluid, even when death took place in four hours was this the case. A specimen of blood taken from a spotted-fever patient and examined by the committee presented the following appear-

eruptive fevers, producing purpuric or ecchymosed spots as these do, and like them having a tendency to the development of internal congestions and inflammations. The ecchymoses which suggested its popular title of spotted fever are certainly not peculiar to it; and the determination to the membranes of the brain and spinal cord, which obtained for it the name of epidemic cerebro-spinal meningitis, is often associated with congestive and inflammatory actions in other organs, and is sometimes absent, as in case 14 and others already instanced.*

In fact this fever-cause acts on the economy like other specific febrile causes; and as it is apparently always associated with one or other of them in the community, and sometimes even in the individual, their relations are intimate.

Occurring as a complication in the progress of well-developed measles, as in cases 37 and 39, the disease would present no difficulty clinically in its recognition; but if the implication of the cerebro-spinal system took place prior to the manifestation of the characteristic symptoms of the specific eruptive fever it would be extremely difficult, indeed impossible, to discriminate between the fever and the complication. In other words, the deterioration of the blood produced by the virus of the eruptive fever would originate a case of cerebro-spinal fever with inflammatory lesions, ecchymoses and death before the real nature of the morbific cause was declared. In individual cases of the eruptive fevers the symptoms and *post-mortem* lesions of cerebro-spinal meningitis apparently originate in the deteriorated condition of the blood produced by the cause of the primary fever. There is at least no necessity for calling in the aid of a special cause to account for phenomena which are sufficiently explained by causes known to be already present. It becomes a question, therefore, whether in epidemics of the eruptive fevers the prevailing miasm may not develop cases not only indistinguishable from but identical with those assumed to be caused by the specific miasm of an epidemic cerebro-spinal meningitis.

The poison of typhus fever affects the blood in the first instance, and in consequence of its deterioration a perversion of nutrition and general disorder of the functions are developed, together with a further degeneration of the blood by the accumulation of tissue-waste. The alimentary mucous membrane, the pulmonary tissue and bronchial lining are the sites of extravasation and other hyperæmic processes; the spleen and kidneys are engorged, the liver altered, the skin maculated. All these organs are usually more or less affected, but sometimes the diseased action is greater in one organ than in another, and some epidemics are characterized by the special implication of a particular organ. The brain and its membranes are seldom affected, notwithstanding the severity of the cerebral symptoms which are attributed to the circulation of a degenerated blood; nevertheless cases do occur in which there is a true meningitis, and these are more common in some epidemics than in others. Nor must it be forgotten that prior to the separation of this cerebro-spinal fever from typhus at Geneva in 1805, epidemics of typhus with cerebro-spinal complications were not infrequent. The history of many of these has been investigated, and they are now cited by most writers as epidemics of cerebro-spinal meningitis. But some medical observers do not concur

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ances. The red corpuscles were shrivelled, crenated, not in rouleaux, and numerous white corpuscles were noticed in the field. * * It will be remembered that the only constant pathological condition is an altered state of the blood,—one in which it fails to coagulate after death and in which the corpuscles have undergone certain marked physical changes indicative of a diminished vitality."—*Transactions*, 1866, p. 329.

* In the report of the Discussion on Spotted Fever at the New York Academy of Medicine, April 27, 1866 in the American Medical Times, Vol. VIII, p. 297, Dr. Clarke is represented as stating that in some cases the virus and specific cause were not found in the cerebro-spinal meningitis was confined to it, but in those cases the inflammation was supposed to be owing, at first in still others when the brain and cord were acted altogether and the inflammation spent its force upon the pericardium, the pleuræ and even upon the lungs." That being true, as the theory in the opinion, was due to a constitution of the system in which there is a tendency to inflammation, which inflammation might show itself in one or another part of the body dependent upon circumstances which we cannot as yet appreciate.

in the propriety of separating this disease from typhus. Boudin endeavored to prove their identity.* Murchison, after reviewing their points of similarity and difference, concluded that before attempting to establish a new specific disease it was necessary to keep in view the many modifications which those already known to us may undergo, and more particularly to study their etiological relations and the circumstances under which they arise and are propagated.† Buchanan considered that in some at least of the epidemics of cerebro-spinal fever the primary fever was akin to typhus, if not actually identical with it.‡ In this country several observers and writers have held similar views: Upham considered the disease to partake of the nature of typhus in a severe and malignant form; Webber§ and Baltzell‖ concluded that epidemic cerebro-spinal meningitis is only epidemic typhus wherein from some cause the cerebro-spinal system is the principal seat of attack. D. W. Draper argued in like manner: The causes from which cerebro-spinal meningitis originates are similar to those of typhus; the symptoms are many of them identical and all of them referable to the same essential dyscrasia, and the lesions, though presenting some striking peculiarities, have all of them been described as belonging to typhus.¶

The symptoms of typhus are usually slow in their development as compared with those of cerebro-spinal fever. Delirium in typhus does not occur until the end of the first or the beginning of the second week. It is due to the influence of the deteriorated and progressively deteriorating blood, and appears to be independent of the passive congestions of the meningeal vessels and the subarachnoidal serum which are often present. On the other hand, in cerebro-spinal fever the delirium is frequently developed in a few hours, and is due in most cases to the inflammatory processes in the pia mater. The eruption of typhus appears on the third or fourth day of the disease; the spots of cerebro-spinal fever oftentimes in as many hours. But if the influence exercised by the typhous miasm is more than usually virulent, constituting that variety of the disease called typhus *siderans*, the symptoms may be intensified and the fever reach its fatal ending in a few days or even hours from the beginning of the attack. Case 388 of the *post-mortem* records of the continued fevers presents the appearances observed in a colored soldier said to have died of typhus,—the brain and its membranes were coated with purulent matter as in cerebro-spinal meningitis. In such cases, especially when accompanied with opisthotonos, it may be impossible to discriminate clinically between the two diseases, and it may be equally impossible to decide after *post-mortem* observation; for if meningeal inflammation be present it may be regarded either as a result of the cerebro-spinal febrile cause or as a meningeal complication of typhus, while, if the inflammation be not present, the disease will probably be regarded as typhus; but a doubt will remain on account of the possibility of death in cerebro-spinal fever before the development of the local lesion.

Thus in typhus, as in the eruptive fevers, the individual case may be complicated by cerebro spinal symptoms and lesions which may consistently be referred to the primary disorder of the blood, while in its epidemic prevalence occasional cases of cerebro-spinal meningitis may appear to raise the question whether a cerebro-spinal fever, originating under conditions which in other instances give origin to typhus, should be regarded as a manifestation of the typhus miasm, which is amply sufficient to explain its peculiarities, or as a disease due to a miasm distinct from that of typhus and all other febrile diseases.

* *Histoire du Typhus Cérébro-spinal ou de la maladie improprement appelée Meningite Cérébro-spinale Épidemique*, par J.-Ch.-M. Boudin, Paris, 1854.
† *On the Cerebro-spinal Symptoms and Lesions of Typhus.*—*Lancet*, 1865, p. 418.
‡ *Typhus Fever*, in *Reynold's System of Medicine*, Vol. I, p. 550.
§ *Cerebro-spinal Meningitis.*—Boylston Prize Essay, 1866, Boston, Mass., 1866.
‖ *Amer. Jour. Medical Sciences*, October, 1864.
¶ See his paper in the *Bulletin of the New York Academy of Medicine*, Vol. II, page 245 *et seq.*

Similarly the supervention of cerebro-spinal symptoms, due to inflammatory changes in the pia mater, is regarded as an uncommon result of the typhoid fever-poison. The history of medical progress in the study of fever is responsible for this belief. At the beginning of the present century typhus, typhoid and cerebro-spinal fevers were confounded. The cerebro-spinal cases were first separated from the others; afterwards typhoid was distinguished from typhus fever. Since typhoid fever has attained recognition as a distinct disease, cerebro-spinal cases occurring during its epidemics have been considered only in other connections. Nevertheless a few cases of true meningitis supervening on typhoid fever suffice to show the intimate relationship of the two diseases. Ordinarily delirium is slowly developed in typhoid, and is due to the gradual deterioration of the blood by the accumulation of the products of metabolic change; but in fulminant cases, where death occurs in a few days, delirium and coma are early symptoms due to the primary influence of the miasm in the blood. Ecchymotic blotches or petechiæ are infrequent, but they do appear in certain virulent cases, which, if speedily fatal, may present the patches of Peyer conspicuous, congested, black-pointed or tumefied but not ulcerated. Of the few cases of apparently pure typhoid fever, submitted in a previous chapter, in which the brain and its membranes were found to have been affected, there was congestion with more or less effusion of serum into the ventricles and subarachnoid space;* but these cases were selected as presenting no anomalies suggestive of a modification by any complicating influence. In the classical cases of Ch. A. Louis, congestion of the cerebral membranes, with effusion of serum, was a frequent observation, but rarely was the serum turbid from flocculi; some opacity of the arachnoid, which apparently antedated the typhoid attack, was found in four cases, and in two cases albuminous particles adhered to the visceral or parietal layer of this membrane.† These cases also were selected to illustrate the ordinary course, progress and lesions of the newly discovered typhoid affection. Among the *post-mortem* records of the continued fevers already submitted are to be found two cases, 80 and 257, in which lymph was deposited on the surface of the brain. In the former, which was regarded as a case of typho-malarial fever, no cerebral symptoms were noted, but the hemispheres were coated with coagulable lymph, the ventricles contained turbid serum and the intestinal mucous membrane was extensively diseased. In the latter, regarded as a case of typhoid fever characterized by delirium and coma, the base of the brain was coated with a thin layer of lymph, the ventricular liquid was turbid and, although the whole of the intestinal mucous membrane was congested, the agminated and solitary glands were unaffected. Both of these cases, from the *post-mortem* stand-point, might have been regarded as cerebro-spinal fever. Again, if the cases reported as cerebro-spinal or spotted fever be examined it will be found that in some the disease apparently supervened on or was coincident with a typhoid attack and while typhoid fever was prevalent in the locality. When the fever ran a regular typhoid course, as in case 15 of the series presented in this chapter, the cerebro-spinal inflammation must be regarded, like pneumonia under similar circumstances, as a complication or secondary result produced by the perversion of nutrition consequent on the circulation of a vitiated blood. But in fulminant cases speedily fatal by coma after aggravated cerebral symptoms and convulsive seizures, the diagnosis becomes obscure and the uncertainty may not be dissipated even by a view of the *post-mortem* lesions, for the absence of typhoid ulceration of the patches of Peyer is, in such violent cases, no evidence of the absence of the typhoid miasm, and the

*See analysis, *supra*, page 431.

†See his *Recherches, etc.*, t. I, Paris, 1829, page 373,—also *supra*, page 431.

absence of lymph or pus in the nervous centres might be considered as no evidence of the absence of the virulent cerebro-spinal miasm, while the presence of these inflammatory products might be regarded either as a secondary result of the typhoid influence or the immediate consequence of a special cerebro-spinal febrile cause. Again the question arises, as in similar cases occurring in epidemics of typhus and the eruptive fevers; and again the reply is suggested, that it is as unnecessary to assume the existence of a special miasm acting on the cerebro-spinal system as to assume the existence of one acting under similar circumstances on the pulmonary tissue; since, in the individual, cerebro-spinal symptoms and lesions may be referred for causation to the typhoid poison, cerebro-spinal cases occurring in typhoid epidemics may likewise be so referred.

But the cases that have been submitted from the medical records of the war appear to connect cerebro-spinal fever more extensively, if not more closely, with malarial diseases than with typhus, typhoid or the eruptive fevers. Congestive intermittents leave the blood fluid, the skin maculated and the interior organs congested and ecchymosed after death by coma, sometimes associated with convulsions. JACKSON's cases of so-called spotted fever* were distinctly congestive. Their recovery under specific treatment demonstrated their malarial character. In the fatal cases the membranes of the brain showed no trace of inflammation, only passing engorgement. So long as the vessels of the pia mater remained in this congested condition a complete and speedy recovery was possible by appropriate treatment. Even if the congested vessels became relieved by effusion of serum into the subarachnoid space and ventricles, a speedy return to health was equally possible. Sometimes the lungs, the kidneys or the intestinal lining were the site of the congestion and, as in the case of the cerebral membranes, recovery was readily effected if the congestion was passive and did not terminate in inflammatory exudation. The hyperæmic processes are continuous one with the other; the boundary line between them can be discovered only with the microscope; yet the passage of this line was generally of vital importance to the patient, as its consequences were the establishment of a pneumonia, a nephritis, a dysentery or a cerebro-spinal meningitis, according to the locality of the hyperæmic tissues. Dr. JACKSON did not observe any case pass beyond the stage of congestion; but some of MERRITT's cases of pernicious fever† at Beaufort, S. C., in May, 1863, presented symptoms of spinal meningitis. KNEELAND recognized at New Berne, N. C., the occurrence at the same time and place of congestive malarial cases and cerebro-spinal febrile cases, and considered them due to different causes of the same generic nature. But it seems wholly unnecessary to call in another cause when influences already recognized as in operation suffice to explain the phenomena.

Undoubtedly the clinical differences between congestion of the brain from malarial poison and cerebro-spinal meningitis are very great. Recovery is effected under proper treatment as if by magic in the one instance, while in the other the result, notwithstanding all treatment, is death or a protracted illness, differing wholly from the usual course of malarial congestion and too often disabling the patient by a permanent impairment of sight, hearing and muscular power. Quinine is an efficient remedy in the one instance and is valueless in the other. These important dissimilarities, seeming to indicate a radical difference in the cause, have obscured the fact that anatomically the difference between the two conditions is small and pathologically even smaller. The prevalence in a malarious locality of the congestive and inflammatory forms of a spotted fever, in which the cerebro-spinal membranes are implicated,

* See *supra*, pages 128 and 141. † See *supra*, page 142.

forms a strong argument in favor of a similar origin for both, and as the malarial poison has been identified with the causation of the one it may well be regarded as the essential of the other. The impotence of quinine as a remedial agent in cases of cerebro-spinal fever does not antagonize the theory of its malarial origin. When malarial congestion of the intestinal mucous membrane has been followed by the ulcerations of dysentery, or when pulmonary congestion of similar origin has developed into pneumonia, the secondary inflammatory result is uninfluenced by the specific for the primary disease; so when congestion of the cerebro-spinal membranes is followed by the extrusion of the products of the secondary inflammation relief may not be expected from quinine. But if the disease had in these instances been due to malaria, quinine ought to have proved in some measure prophylactic. Unfortunately there is no evidence on this point. The attention of our medical officers does not appear to have been directed to it. Dr. KNEELAND was apparently the only officer who tried to protect his men in this manner. His experience, so far as it goes, is interesting. Only four cases occurred in his regiment after the death of the first case led him to use quinine as a preventive. Not all of the men were so protected, but only those ordered on duty necessitating exposure during the night; meanwhile the two neighboring regiments continued to furnish cases for the New Berne hospitals.

It has already been shown that in continued malarial fever congestion of the membranes of the brain with effusion was a common *post-mortem* observation; in case 287 of the *post-mortem* records of the continued fevers there were in addition ecchymoses of the surface of the cerebrum and on the floor of the fourth ventricle; but in 80 and 257 distinct evidences of inflammation were presented. In the first of these cases the patches of Peyer were prominent and speckled with blood; in the second the ileum was gangrenous; in the last the agminated glands were reported as normal.

Similar conditions of congestion of the brain and its membranes were found in the typho-malarial and mixed or uncertain cases; but in 111 the examination revealed thickening and opacity of the arachnoid over the interpeduncular space; in 379 exudation on the arachnoid, engorgement of the brain-substance and distention of the ventricles with blood-stained serum, and in 303 injection of the membranes, turbid effusion in the ventricles and extruded lymph at the base of the brain. In the first of these the patches of Peyer were enlarged; in the second their condition was not stated; in the last ulcerated.

Some of these cases indicate the existence of cerebro-spinal lesions complicating continued malarial and typho-malarial fevers, and since these lesions may occur in the individual case as a result of the malarial poison, there is every reason for referring to the same poison those cerebro-spinal cases or spotted cases without cerebro-spinal symptoms that occurred in localities where malarial fevers were prevailing. It may be objected, however, that the season of prevalence of epidemic cerebro-spinal meningitis was not that of the malarial fevers. The former was distinctly a winter phenomenon. None of the 105 cases submitted occurred in the month of May, 3 in June, 2 each in July and August, 1 in September and 2 in October. Cases were rare in the months when the malarial tide was high, but on its subsidence they became more numerous,—in November 3, in December 8, in January 31, in February 25, in March 18 and in April 10. No reliance can be placed on these figures as indicating monthly prevalence, but they may be accepted as sustaining the statement of many of our officers that spotted fever was seen chiefly during the colder months of the year. But this argument would exclude hemorrhagic malarial fever from the list of malarial diseases, and

also the many cases of undoubted congestive chills that occurred, as in JACKSON'S command, during the winter months. It may be, as already suggested in treating of malarial hæmaturia, that in these virulent cases the malarial miasm effected an entrance into the system in a concentrated state by means of the water-supply.

Lastly, the occurrence of cerebro-spinal or spotted fever may be referred to the fulminant operation of that miasm which produced pneumonia under ordinary conditions. Viewing pneumonia as a specific constitutional disease, with a local lesion in the lungs,* it becomes connected causatively with cerebro-spinal meningitis by the arguments that have served to effect a similar connection between typhoid fever and the cerebral manifestations. This connection will be found to be no mere theoretical idea, for in the instances in which the medical records of the war show an epidemic prevalence of pneumonia with a corresponding intensity of the febrile poison, the so-called cerebro-spinal meningitis was present at the same time. Surgeon IRA RUSSELL, who reported fifty cases of cerebro-spinal fever among the colored troops at Benton Barracks, Mo., in January and February, 1864,† reported also the great prevalence and fatality of pneumonia, 784 cases, of which 156 proved fatal, having been received into hospital during the four months, January 1 to April 30.‡ In another instance the report of Surgeon D. PORTE SMYTHE, 19th Texas Inf.,§ shows that the epidemic pneumonia which affected his regiment and others of the same division gave him in one month, in a strength of 900 men, 200 cases of pneumonia, ten per cent. of which were of cerebral or erysipelatous types. The cerebral cases, which were at first regarded as meningitis, were characterized by rigors and headache; there was little pulmonary disturbance, but death ensued in from twelve to twenty-four hours with convulsions and delirium.‖

From the constant change in the blood, the frequent ecchymotic blotches and the occurrence of cases unattended by cerebro-spinal inflammation, it is evident that in the disease under consideration there was more than a cerebro-spinal meningitis due to those general atmospheric conditions, such as cold, exposure and bad ventilation, that provoke the common phlegmasiæ of fibrous and serous membranes. A febrile poison must be assumed in its causation. The natural history of this febrile cause is extremely obscure, or as CHAUFFARD expresses it, the etiology of the disease is *enveloppée d'ombres impénétrables.*¶ This is chiefly owing to the apparently contradictory observations that have been made and recorded. But if the causation be referred to the occasional operation of any of the miasmatic influences which destroy the integrity of the blood and develop hyperæmic conditions of the various organs these contradictory observations become reconciled.

The cause, for instance, judging from the intensity of the disease in the individual case, is one of great virulence; but in its operation on the community this virulence is not correspondingly evidenced. The cases of an epidemic are comparatively few and scattered, and there is no explanation of the protection of the many analagous to that which holds good in other febrile diseases, as scarlet fever or measles; but if they be regarded as the cerebro-spinal or spotted manifestations of a prevailing febrile cause, the virulent scattered cases become bound together by others of less malignancy.**

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* See *infra*, page 804. † See *supra*, page 586. ‡ See *infra*, page 758. § *Infra*, page 758.

‖ JUERGENSEN refers to the frequency of the association of an epidemic meningitis with pneumonia, and cites IMMERMANN and HELLER as having recently called the attention of physicians to this point. Out of thirty autopsies in cases of pneumonia they found nine in which meningitis was also present. It was ascertained beyond question that an epidemic of cerebro-spinal meningitis was prevailing at the same time.—*Ziemssen's Cyclopedia, American Ed.*, Vol. V, p. 115.

¶ Quoted by ZIEMSSEN.

** The Committee "On Spotted Fever, so-called," in its report to the American Medical Association, drew attention to this,—see page 337 of the Transactions, 1866: "When the attention of the profession in Philadelphia was called to the existence of spotted fever there was prevailing in that city a severe and wide-spread epidemic of *influenza* or epidemic catarrhal fever. * * * Several medical men in active practice were at once struck with the

On this view the different statements with regard to the climatic and other conditions associated with its epidemics may also be understood. Dr. UPHAM continued his study of the disease after the war and furnished an able report to the Massachusetts Board of Health on the epidemic of 1873, based upon communications from two hundred physicians transmitting the facts in five hundred and seventeen cases.* From these he found that all ages, occupations and nationalities were susceptible of the disease. The cases were distributed among all classes and grades of society,—"the high and the low, the rich and the poor, locations unexceptionable for situation, open to abundant light and air, and the pent-up hovels of the lowly and wretched have all contributed to the material of the epidemic." STILLÉ† says that localities of every sort, high and low, dry and moist, those saturated with marsh miasmata and those favored by the pure breezes of mountain districts have been alike invaded; the disease has passed by large cities reeking with the corruptions of a soil saturated with ordure and a population grimed with filth to devastate clean and airy villages and the families of substantial farmers inhabiting isolated spots. Its greater prevalence in the winter months appears to be one of the few features which remain unaltered in the investigation of many epidemics; but even this is unconnected with low temperature, for while YAGER represents the beginning of the Chillicothe epidemic as having coincided with a snow-storm following dense fogs and chilly east winds, WARE reports the outbreak at New Berne as having been preceded by a period of dry warm weather. In the former instance measles prevailed; in the latter typhoid fever and malarial diseases.

In many cases the disease occurred suddenly and unexpectedly in the strongest and apparently the soundest men of the command; but in this it did not differ from congestive malarial fever. In the greater number, however, the sufferers were broken down by continued hardships, fatigues and exposures. This was specially noted by RUSSELL in his account of the epidemic among the escaped and emancipated slaves. The disease frequently selected its victims from the guard-house or prisons, and the inmates of these before their commitment had usually undergone many hardships, among which may be particularly noted exposures at night in malarious localities, with insufficient food, shelter and clothing. Even after their commitment they were often insufficiently provided with clothing and blankets. A large number of victims was also drawn from detachments of recruits who had frequently to endure unnecessary suffering on account of their ignorance and that of their officers, while they were at the same time peculiarly liable to those scourges of new regiments, typhoid fever and measles. Overcrowding is frequently referred to as a probable cause; but it seems that this operated as a predisposing cause of cerebro-spinal fever only when the diseases just mentioned were present and aggravated by deficient air-space and defective ventilation. In the presence of other and essential elements of causation, overcrowding no doubt exercised a pernicious influence, but of itself it was as incompetent to explain the presence of cerebro-spinal fever as to account for the large death-rate among Confederate prisoners, when their Union guard, who were similarly crowded, had a comparatively small rate.‡

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resemblance of many of the symptoms of the two diseases, and were led to inquire if influenza might not be but a mild manifestation of that epidemic influence which in its intensity produced spotted fever. Nor, it will be seen, were their symptoms very dissimilar save in degree. * * * The Committee do not propose to reopen this subject more than to call the attention of the Association to the interesting fact of the almost uniform coincident prevalence of spotted and of catarrhal fevers."

* Although the year 1873 was considered an epidemic year it does not follow that the disease was absent in other years. During the ten years, 1873–82, 2,053 deaths occurred in Massachusetts from cerebro-spinal meningitis. Of these 747 occurred in 1873 and an average of 130 in each of the nine other years.

† *Epidemic Meningitis.*—ALFRED STILLÉ, Philadelphia, Pa., 1867, p. 95.

‡ See *supra*, page 66.

Dr. GAILLARD, in an article on the disease in the civil population, noted what he considered a remarkable feature of its prevalence in the Southern States. Contrary to its recorded history elsewhere, as many adults as children were the subjects of its attack.* The greater prevalence of malarial disease, affecting young and old alike in the South, would account for this want of consistency with returns from localities where susceptibility to typhoid and the eruptive fevers constituted an important factor in the prevalence of cerebro-spinal fever.

By some observers, especially in Europe, the disease has been regarded as contagious. A suggestion of contagion appears in the records of the National hospital, Baltimore, Md., where typhus fever was probably present,† and perhaps in PAGE's recorded case 13, from Galloupe's Island, where measles prevailed extensively in a virulent form,‡ but in other instances no mention is made of contagion unless to deny its existence. WARE, in his account of the disease in the malarious region around New Berne, states that there was no evidence of contagiousness,§ and it is well known to the writer that the disease did not spread in the division field hospitals of the Army of the Potomac, although no attempt was made to isolate the occasional cases that were received from the regimental camps.

In conclusion it is submitted that as the so-called typhoid condition may occur in the progress of any fever by the gradual deterioration of the blood, so the so-called spotted fever may be the result of any febrile miasm which destroys the integrity of the blood. When death is not a quickly following consequence of this alteration perversions of nutrition are in order, more actively manifested in some organs than in others, and depending generally, perhaps always, on local or accidental conditions involving among others climate, exposure, overwork and the physiological status of the organs as determined by hereditary tendencies, growth, age and previous disease. The lungs, the pleural, pericardial or synovial membranes, the liver, spleen or kidneys, the alimentary mucous membrane or the vascular membrane of the cerebro-spinal system may become the parts chiefly involved, and death is imminent in proportion to the deterioration of the blood, the activity of the localized hyperæmia and the vital importance of the part affected. When the brain, lungs or pericardium become involved death may result before those special signs are manifested which permit of a discrimination between one febrile miasm and another; hence spotted fever ending fatally prior to local developments or with congestive or inflammatory conditions of these important organs, may be attributed to malarial, typhous, typhoid, eruptive or other miasm, according as the locality and other circumstances bearing on the etiology appear to determine. When death is not so imminent the peculiar phenomena attending the cerebro-spinal lesion are so profound as to veil the true nature, etiologically speaking, of the disease, giving it characters apparently *sui generis*, but in no way inconsistent with its original development from the identical cause that produced a typhoid, typhus or remittent fever in another sufferer.

III.—PREVENTION AND TREATMENT.

PREVENTION.—If the views that have been submitted on the etiology of the diseased condition under consideration be admitted, preventive measures may be undertaken with some hope of diminishing the number of attacks. These measures will embrace those necessary to the suppression of existing epidemics of febrile disease: Isolation and disinfection in some instances, and the application of certain hygienic rules to the individual, the command and

* *Richmond Medical Journal*, Vol. I, 1866, p. 205.
† See *supra*, page 570. ‡ *Supra*, page 583. § *Supra*, page 557.

their surroundings in all instances. But these do not require special mention in this connection, as they properly belong to the specific diseases.

It is probable that in many cases during the war the use of prophylactic doses of quinine, as employed by Surgeon KNEELAND, would have been of value, for although cases occurred when the patients had been taking quinine just before the attack, other miasms than the malarial were evidently present with the command affected in these particular instances.

The avoidance of unnecessary causes of exhaustion is an elementary or essential principle in military hygiene sometimes contravened by commanding officers ignorant of the effects of the parades, drills and disciplinary exercises imposed by their orders. In times of epidemic febrile disease all exhausting work not imperatively required by the military conditions should be particularly avoided, for overfatigue, want of sleep, exposure to the elements, hunger and overstrain of mind which the private soldier may undergo at his post on picket or in the rifle-pit, appear to have been factors of some importance in the determination of cerebro-spinal complications. Certain hardships, exposures and anxieties are unavoidable. Picket and guard duties have to be performed in all weathers, during the night as during the day, and when the men are exhausted after a long march as when they are fresh after some days of rest in camp. In such cases much may be done to control the evil consequences of overfatigue and exposure by official inspection to insure that the men be well provided against possible contingencies and that the exhaustion of hunger be not associated with that of overfatigue.

TREATMENT.—The great disorganization of the blood in quickly fatal cases, and the rapidity with which inflammatory products were extruded on the surface of the nervous masses in the majority of cases, alike intimate the probable inefficiency of all plans of treatment; for in both sets of cases a lesion was inflicted which proved fatal without affording the time needful to effect its reparation.

In most of the recorded cases purgatives by the mouth or rectum were administered. In the early period of the attack cold was generally applied to the head, cups to the neck and counter-irritation by mustard to the extremities; later, blistering plaster or mustard was applied to the scalp, neck and along the spine. But although these remedial measures are frequently found on the records as part of the treatment it is seldom stated that any benefit was derived from them. In 83 cold cloths, cupping to eight ounces and purgation by castor oil were followed by temporary improvement, and in 87 and 101 some relief was attributed to cupping, but in 86 and many others no apparent effect was produced.

These measures were usually reinforced by attempts at specific medication. Quinine was a favorite remedy. In case 1, a recovery from cerebral symptoms and sloughing spots, ten grains were given every four hours; in 48, also a recovery, the symptoms became aggravated when quinine was intermitted and were relieved on the resumption of the medicine, and in 6 its administration was followed by temporary improvement. But eighty grains, administered on the first day of the attack in 12, did not prevent a rapidly fatal course; ten-grain doses every four hours in 50 and half-drachm doses in 14 were not efficacious, nor was the remedy more successful in 4, 13 and 67. Indeed, in case 92 the patient was taking quinine with apparent success for an intermittent at the time of the cerebro-spinal onset. In some instances, as 5, 7 and 9, stimulants were used in conjunction with the quinine. Evidently certain cases were benefited by quinine, although in others its administration was apparently valueless. Surgeon IRA RUSSELL, U. S. Vols., considered

that the remedy, if given early and before the state of collapse came on, in many instances averted its onset, but whether by exercising a specific influence on the disease or merely removing one of its predisposing causes he was unable to determine, as his experience was confined to cases occurring in a malarious locality.

Calomel was sometimes given as a purgative; generally, however, it was used in small doses with quinine, as in the favorable case 17 and the slowly fatal case 11, which was at one time regarded as a recovery. Calomel was given alone in case 32, which recovered. Ipecacuanha was conjoined with calomel or calomel and quinine in a number of cases, as in 26, which recovered; in case 2, in which an improvement lasting three weeks terminated unfavorably and in 18 and 20, in which also an amelioration of the symptoms preceded a fatal relapse. In 23 salivation took place, but it is doubtful if the favorable issue in this case should be attributed to the constitutional action of the remedy, for two cases have already been submitted in which the patient at the time of the attack was under the influence of mercurials.* Moreover, in 16, 19, 20, 21 and 22 the progress of the disease does not appear to have been influenced by this treatment. Similarly, in case 3, in which blue-pill was used instead of calomel, no manifest effect was produced.

In 93 acetate of ammonia, antimonial wine and sweet spirit of nitre were used without beneficial effect. In 84 small doses of tartar emetic and in 94 two-grain doses of this substance every two hours for some time were similarly valueless. Veratrum viride, ipecacuanha and nitrate of potassa were without success in 104. Iodide of potassium was given in case 2 during a temporary remission. Bromide of potassium in fifteen-grain doses every hour was followed in 105 by subsidence of the tetanic convulsions; small doses of strychnia were then added to the bromide in this case, which ended fatally. Dr. F. Le Baron Monroe claimed decided advantages over other remedies for the bisulphite of soda, and stated that two of his recoveries at Galloupe's Island, cases 12 and 13 of Page's series, were treated exclusively with this substance;† but a fatal case of the same series was also treated in this manner. A warm bath returned the patient temporarily to consciousness in 87. Morphia is said to have given relief in 28 and 93. Dr. Lidell enunciates the proposition that treatment to be successful must prevent effusion or cause its absorption prior to fatal compression of the nervous centres, and conceives that in opium freely administered we have a remedy which will effect this, in view of its power to arrest exudation from serous membranes, as seen in the treatment of pleurisies and puerperal and traumatic peritonitis.‡ In protracted cases stimulants were invariably given.

General bloodletting appears to have been tried in two cases: In 25 the abstraction of eighteen ounces was followed by decided improvement, which continued for some time under quinine, but death took place in a relapse; in 24 the removal of twenty-four and afterwards of sixteen ounces of black blood had no influence in postponing the fatal issue and but little in relieving the restless delirium. Regarding the disease as primarily a meningitis, Jones recommends bleeding to faintness, cups, purgatives and mercury, with quinine and opium during the active period; but as his pathological views are manifestly incorrect, the treatment by general bleeding cannot be accepted unless supported by better results than have hitherto been brought forward.

* See the case of Corporal Joseph B. Grow and that reported by W. S. Armstrong, of Mobile, Ala., *supra*, p. 595.

† *Boston Medical and Surgical Journal*, Vol. LXXIII, 1866, p. 253.

‡ *American Jour. Med. Sciences*, Vol. XLIX, 1865, p. 17,—Opium, however, was in common use in the treatment of this disease as early as the beginning of this century. See Stille, *On Epidemic Meningitis*, Philadelphia, 1867, p. 154.

Catheterization was frequently required, and in some instances was followed by decided temporary relief to the restlessness, as if the distended condition of the bladder had been responsible for a part at least of the distress which was its cause.

Viewing the disease as a manifestation of a disordered condition of the blood produced by a miasm which may not be the same in all cases, a rational plan of treatment requires in the first instance the determination of the causative miasm. By this means cases that will be benefited by the early and free use of quinine may be separated from those in which no satisfactory results are to be anticipated from its administration. But obviously, even in malarial cases, no good can be effected by the specific after exudation has taken place. In the stage of collapse hot applications and other stimulants to the surface, with alcohol and ammonia internally, appear to be suggested irrespective of the nature of the cause. During reaction cold to the head, mercurial purges in malarial cases characterized by constipation, cups to the neck, antimonials or ipecacuanha may be used, with opiates when there is much pain and restlessness. When the manifestations of cerebro-spinal exudation indicate that the gravity of the case depends more on the local lesions in progress in the nervous centres than on the primary condition of the blood, blisters to the back of the head and spine and small doses of calomel, as generally used by our medical officers, or iodide of potassium in large doses, may be employed. But meanwhile, if typhoid symptoms supervene, stimulants should be administered and continued with appropriate nourishment throughout the progress of protracted cases.*

II.—PNEUMONIC FEVER.

In referring to certain of the pneumonias of our camps and hospitals under this title the writer departs advisedly from the official nosology which regarded, and still regards, pneumonia as a local disease associated with catarrhs and bronchitic affections that are usually ascribed to atmospheric vicissitudes and exposures. He has less hesitancy in taking this liberty with the official methods as his investigation into the nature of the continued fevers has shown that the diseases of which our soldiers died were by no means in all instances those under which they were reported in the Monthly Report of Sick and Wounded. Indeed, the connection between cases of pneumonic disease and the fevers, malarial or typhoid, of our camps was so striking that the medical officers in attendance set the example of a departure from the official nomenclature. The term pneumonia on the blank forms in use did not seem to give full expression to the diseased conditions present in their cases, and in many instances they qualified it with the word *typhoid*. But the clinical resemblance of the disease in question to typhoid fever forms, as will be shown hereafter,† no part of the argument which led to the adoption of the term pneumonic fever in the present connection.

By this term is, of course, understood a specific constitutional affection with a characteristic and constant lesion in the lungs. In the continued fevers—typhoid, modified typhoid

* The Committee on "Spotted Fever, so-called," of the American Medical Association, Vol. XVIII, *Trans.* 1866, p. 341, after reviewing the various plans of treatment that have been used, recommended, in view of the typhous character of the essential fever, that the same general principles adopted in the treatment of typhus fever be applied to this disease. In the first stage the patient should be placed in a hot bath, 102–106° Fah. After this he should be rubbed with coarse towels, or oil of turpentine if there is a tendency to coldness of the surface. When the bowels are torpid an enema of turpentine is recommended; prostration should be treated by alcohol or ammonia, and pain, hyperæsthesia or jactitation by opium. If opium is not required in the beginning large doses of quinine may be advantageously given; but this remedy is valueless and may prove hurtful if given after exudation has taken place. Cold to the head and spine is advised when cerebro-spinal symptoms are prominent from the first. Local depletion by cupping is cautiously recommended in some instances, but the use of the lancet is condemned. Tincture of iron, mineral acids and turpentine may be used if the stomach will bear them, but care should be taken not to disturb that viscus. The iodides of potassium and iron are recommended when the case has become chronic and presents unequivocal evidences of exudation. The Committee failed to get satisfactory results from blisters along the spine.

† *Infra*, page 804.

and continued malarial—conditions usually regarded as results of pneumonic inflammation were frequently developed toward the close of the scene in fatal cases. The *post-mortem* records illustrate this frequency by showing that in no less than sixty-eight per cent. of the whole number of recorded cases there was congestion of the pulmonary tissues, with more or less solidification from transudation, constituting the conditions indicated by the terms œdema, splenization, hepatization and, when histolytic changes were in progress, purulent infiltration, or, as sometimes phrased by cautious observers, pur*uloid* infiltration. Generally, in these cases, the symptoms attending the progress of the complication were obscure. There was no aggravation of the febrile conditions, and the vital activities were so depressed that the occlusion of a large portion of the cellular structure of the lungs failed to exercise a marked effect upon the ebbing life. Nevertheless local changes, subsequently verified at the *post-mortem* investigation, were susceptible of definition by physical examination. The blending of different fevers may be considered at the present time as a well-established pathological doctrine;* but it is difficult to recognize in these almost passive congestive changes the supervention of pneumonic fever on pre-existing typhoid or malarial fever, although in many cases the local lesions were precisely those of a pneumonic fever. Their explanation must be found rather in the enfeebled condition of the heart and disordered state of the blood, which together developed the pulmonary stasis,—the starting point of pulmonary transudation, hepatization and subsequent degenerative changes. In these cases the *post-mortem* condition of the air-cells as to crepitus, solidification or diffluence depended on the duration and activity of the vital processes subsequent to the occurrence of the congestive stasis. This view, which associates these pulmonary lesions with prostration and a deteriorated condition of the blood, is sustained by the frequency with which similar pneumonic changes were found to originate in the closing hours of other febrile and exhausting diseases, as measles, small-pox, acute diarrhœa and dysentery.

But similar changes took place in the lungs at earlier stages of the continued fevers, constituting what was recognized as intercurrent pneumonia, illustrations of which may be found in the clinical records of those fevers. In these cases the constitutional disturbance marking the invasion of the pulmonary tissue was at times so prominent as to lead to a diagnosis of pneumonia or typhoid-pneumonia when, as in cases 331–339, 353–360 and 370–372 of the *post-mortem* records, the primary disease was a typhoid or continued malarial fever. It is difficult to say whether in these cases the lung disease was a local congestion with consequent transudation and a symptomatic aggravation of the constitutional disturbance which was its cause, or the local expression of a pneumonic fever which had seized on the typhoid or malarious patient and blending with the pre-existing fever tended to the more rapid extinction of life.

The frequency of the occurrence of similar lesions in the advanced stages of the continued fevers, and the intercurrence of similar attacks in other diseases characterized by a depraved condition of the blood, suggest that in many of these instances the changes in the lungs resulted from the action of the typhoid or other febrile poison. Congestions and tumefactions of the spleen are common in all these fevers in accordance with the testimony of clinical exploration and *post-mortem* observation; but the anatomical characteristics and physiological uses of this organ are such that the distention of its vessels is not followed by dangerous consequences. Similar hyperæmias of the lungs interfere with their physiological

* See FLINT's *Practice of Medicine*, Phila., 1884, p. 181.

action, and the anatomical characters of the pulmonary tissue permit of transudations which give a greater permanence to the interference. Local hyperæmias occurring in the progress of fevers derive their importance from their locality: In the distensible spleen they are comparatively harmless, perhaps of value as protective against similar manifestations in more important sites; in the non-elastic parotid they lead to necrotic changes; in the intestinal mucous membrane they are productive of diarrhœal and dysenteric lesions which, in many cases, assume diphtheritic characters; in the lungs pneumonia is caused; in the nervous system their deadly results are those of cerebro-spinal meningitis. It seems probable, therefore, that in many of the cases under consideration there was merely a manifestation of the typhoid or the malarial poison and not the supervention of a new disease.

Nevertheless the occurrence of a pneumonic fever in the person of one suffering from typhoid or other continued fever must be accepted if the existence of a specific pneumonic fever be allowed; for there is nothing in the history of pneumonia or of the continued fevers to show that the subjects of the latter were less susceptible to the attacks of the former than healthy men who had been similarly exposed to its causes. Pneumonia was of frequent occurrence as the only disease affecting the system at the time. It was characterized by febrile accession and local changes in the lungs, such as occurred in the progress of typhoid or other continued fevers. But the special lesions of those fevers were not present; the pulmonary changes were wholly independent of the typhoid or malarial poisons. In many cases the spleen was enlarged and various changes were occasionally noted in the other viscera, but only the pneumonic changes were constant.

Although unaccompanied with typhoid lesions this disease, as will be seen hereafter,* was frequently associated with typhoid symptoms. Hence the term typhoid-pneumonia which, unfortunately, became so familiar during the war. The typhoid symptoms, as when occurring in the progress of a continued malarial fever, were apparently the result of the febrile condition in asthenic states of the system, especially in that brought about by the hardships of field service and overcrowding in quarters. In typhoid-pneumonia there was no typhoid fever, although in cases of concurrent diarrhœa there was frequently a difficulty during life in determining the absence of the specific typhoid poison.

The relations of pneumonic fever to the other continued fevers are thus seen to have been by no means intimate, notwithstanding the apparent testimony of the clinical and *post-mortem* phenomena to the contrary. The seemingly intimate clinical relations of pneumonia to typhoid and the seemingly intimate *post-mortem* relations of typhoid and typho-malarial fevers to the pneumonic disease were the result of similar, not identical, conditions of the system. Pneumonic fever occurred in those fevers only as an intercurrent and accidental disease, and with much less frequency than would appear from the separate consideration of either the clinical or pathological phenomena.

III.—DIARRHŒA AND DYSENTERY.

As has been shown in the chapter on the Continued Fevers, diarrhœa or dysentery was a frequent manifestation of the presence of a febrile miasm. It was due in malarial cases to hyperæmic conditions of the intestines in which the large intestine and its solitary glands were generally implicated; in typhoid cases it was symptomatic of the condition of the patches of Peyer, although in many instances the mucous membrane of the large intestine and

* *Infra*, page 767.

especially of the cæcum was also involved: and in the typho-malarial or mixed cases it was due in part to the typhoid ulceration of the ileum and in part to the malarial congestion and follicular ulceration frequently observed in fatal cases in some part of the intestinal canal. It is not surprising, therefore, that the symptom should occasionally have been regarded as the disease, the diagnosis of diarrhœa or dysentery having been recorded when the morbid lesions in the case were really those of a continued fever. Moreover, as will be seen directly, diarrhœa and dysentery were sometimes accompanied by constitutional symptoms of an adynamic character, thus tending to the opposite error of regarding these diseases in some of their instances as cases of continued fever or of paroxysmal fever in which the remissions were slightly indicated.

But although diarrhœa and dysentery were so often an accompaniment of malarial fever that they must be regarded in certain cases as indications of the presence of the febrile poison, they were by no means so frequently accompanied by paroxysmal manifestations: hence intermittent or remittent fevers may not be considered as symptomatic of diarrhœa or dysentery, or, in other words, these diseases must be ascribed to other causes than the causes of the malarial fevers. Nevertheless, of seven hundred and eighty-six fatal cases of diarrhœa and dysentery recorded in the Second Part of this work, the patients in thirty-four were reported as having been affected with intermittent fever and in twenty-seven with remittent fever. The presence of the intermittent symptoms in the cases in which the records mention them will scarcely be doubted. Similar credit should attach to the diagnosis of remittent fever in the cases so recorded. Were the cases in which this association was observed coincidences, *i. e.*, results of an exposure to the causes of both the fever and the flux, or was the latter a symptom of the febrile poison and due to the direct influence of that poison? Dr. Woodward has discussed this question at length.* He was fully aware of the coexistence of dysentery and malaria in individuals and districts, and of the increased frequency of the former in malarious regions,† as well as of the very general opinion of our army surgeons that malaria was a cause of dysentery. Indeed, at one time he held this opinion himself; but because Dutroulau and Hirsch gave instances of the prevalence of dysentery in non-malarious sections and of malarial fevers where dysentery was unknown, he was led to abandon the doctrine and to ascribe to malaria merely a predisposing influence in the causation of diarrhœa and dysentery: and so thorough a convert did he become to this new doctrine that he referred to our American observers as having fallen into the error of regarding dysentery and malarial fevers as due to a common cause.

But it has not been shown that our medical officers were in error. On the contrary, the argument derived from clinical and pathological considerations appears to sustain their views. The intestinal lesions of acute diarrhœa consisted of a hyperæmia of the mucous membrane of the small intestine, the villi and closed glands being somewhat enlarged and not unfrequently pigmented, especially in protracted cases, with usually similar inflammatory appearances generally more advanced in their progress in the cæcum and descending colon. In what was regarded clinically as acute dysentery there was, in addition to these appearances, a follicular ulceration of the colon with coincident thickening of its submucous coat, or diphtheritic exudations, sloughs and ulcers in this part of the canal. In chronic cases

* See pages 287 and 396, Part II of this work.

† [illegible] may be of interest. The following tabulation has been prepared from data derived from Table XI of the Mortality Statistics, showing deaths in certain grand groups with specification of cause. Proof-sheets of this table were courteously furnished to the writer by George W. Richards of the Census Bureau, April 19, 1884. The grand groups embodied in the tabulation comprehend respectively the following portions of the country:

of diarrhœa and dysentery there was a chronic inflammation, with or without ulceration, of the mucous and submucous coats of the intestinal canal, especially of the large intestine; and this was frequently complicated in fatal cases by the development of more acute lesions shortly before the occurrence of death. But these, especially in their acute forms, were precisely the conditions, so far as can be learned from the records, that characterized the incidence of the malarial poison on the alimentary tract. It is impossible, therefore, to discriminate by the intestinal lesions between a diarrhœa or dysentery due to a malarial hyperæmia and that originating from other causes. Under these circumstances the clinical record gives testimony of value. Unfortunately this seldom consisted of more than the recorded diagnosis. Nevertheless, as already suggested, it is entitled to credit as the opinion of qualified men based upon a consideration of the clinical phenomena. When the attending medical

Group 2. *The Middle Atlantic Coast.*—Delaware, the District of Columbia and parts of New York, New Jersey, Maryland and Virginia, including the cities of Brooklyn, New York, Camden, Jersey City, Newark, Baltimore, Wilmington and Washington.

Group 3. *The South Atlantic Coast.*—Parts of North Carolina, South Carolina and Georgia, including the City of Charleston.

Group 4. *The Gulf Coast.*—Parts of Florida, Alabama, Louisiana, Mississippi and Texas, including the City of New Orleans.

Group 8. *The Interior Plateau.*—Parts of New York, Pennsylvania, Virginia and North Carolina, including the cities of Albany, Syracuse, Troy, Allegheny City, Philadelphia, Pittsburg, Reading and Richmond.

Group 9. *The Southern Central Appalachian Region.*—Parts of Virginia, West Virginia, North Carolina, South Carolina, Kentucky, Tennessee, Georgia and Alabama.

Group 10. *The Ohio River Belt.*—Parts of Ohio, Indiana, West Virginia and Kentucky, including the cities of Cincinnati, Dayton and Louisville.

Group 11. *The Southern Interior Plateau.*—Parts of South Carolina, Georgia, Alabama, Mississippi and Tennessee.

Group 12. *The South Mississippi River Belt.*—Parts of Kentucky, Tennessee, Mississippi, Louisiana and Arkansas.

Group 14. *The Southwest Central Region.*—Parts of Missouri, Arkansas, Louisiana and Texas.

Group 15. *The Central Region of Plains and Prairies.*—Parts of Ohio, Kentucky, Tennessee and Indiana, including the cities of Columbus, Nashville and Indianapolis.

Group.	Population.	Mortality rates per 100,000 living.					Ratio of malarial deaths to diarrhœal deaths.
		Diarrhœa.	Dysentery.	Enteritis.	Total diarrhœal diseases.	Total malarial diseases.	
8	5,714,683	20	21	21	62	20	1 : 3.1
10	2,440,339	23	24	26	73	25	1 : 2.9
9	2,697,958	21	35	19	75	28	1 : 2.7
2	4,376,135	42	34	22	98	35	1 : 2.8
15	4,403,662	15	25	24	64	39	1 : 1.6
11	3,625,545	21	31	27	79	88	1 : 0.9
3	875,086	37	24	19	80	96	1 : 0.8
4	1,056,034	30	30	42	102	97	1 : 1.1
14	2,932,676	24	79	42	145	104	1 : 1.4
12	710,250	23	31	33	87	129	1 : 0.7
Total	28,832,368	24	33	26	83	51	1 : 1.6

From this table it appears that in a population of nearly twenty-nine millions, occupying certain districts of the United States, the deaths from malarial fevers during the census year averaged 51 per 100,000, and those from diarrhœal diseases reported as diarrhœa, dysentery and enteritis 83 per 100,000, the former being to the latter as 1 : 1.6. It may be noted that in Group 15 a malarial death-rate of only 39 per 100,000 was associated with a diarrhœal death-rate which bore to it the average ratio of 1.6; and that those groups having a lower malarial death-rate than this had the ratio of diarrhœal to malarial deaths higher than the average, while those with a higher malarial death-rate had the ratio of diarrhœal to malarial deaths considerably lower than the average. Where the malarial death-rate was small the diarrhœal death-rate exceeded it very largely; and on the other hand, where the former was large the latter did not even equal it. Thus, Group 8 had but 20 malarial deaths, which were to those from enteritic disease as 1 : 1.1, while Group 12 had 129 malarial deaths, which were to the deaths from intestinal fluxes as 1 : 0.7. From this it would seem that the relations, if any exist, between malarial fevers and diarrhœa and dysentery are not of so intimate a character as to counterbalance other influences affecting the death-rate of the latter diseases. Nevertheless it may not be concluded that there is no relation between them, for the diarrhœal death-rate rises with the malarial rate, although neither in the same proportion nor regularly in any proportion. Thus, while the lowest malarial rate, 20 per 100,000 in Group 8, is associated with the lowest diarrhœal rate, 62 per 100,000, and the highest diarrhœal rate, 145 in Group 14, is associated with a high malarial rate, but the highest malarial rate, 129, occurring in Group 12, corresponds with a diarrhœal rate, 87, which is but slightly above the average of all the groups. An increased fatality of malarial diseases, therefore, implies an increased fatality of diarrhœal diseases; but, as the increase of the one does not correspond with that of the other, it follows that they are due neither to the same cause nor to the same conditions of causative development in all or even in a majority of cases. It may be remarked that the figures here given are consistent with the position taken in the text, to-wit: that although diarrhœa and dysentery are, in certain cases, symptomatic of the incidence of the malarial poison on the intestines, and although this poison may exercise a strongly predisposing influence to diarrhœal and dysenteric attacks, there are other causes, some no doubt of a specific character, which exercise a far more powerful influence on the prevalence and fatality of the intestinal fluxes.

officers recorded a case as one of remittent fever, and the *post-mortem* examination discovered only the lesions of acute or chronic diarrhœa or dysentery, it is fair to assume that the flux was the direct result of a malarial cause.

Manifestly it would be absurd to argue from this that malaria was the direct cause of diarrhœa and dysentery in all cases. It has been proved that dysentery may prevail in non-malarious regions, but our medical officers did not hold that malaria was the only cause of dysentery. It has been shown that malaria may exist without dysentery, but they did not hold that malarial fevers were always characterized by dysenteric symptoms. They believed that in many of the cases of dysentery that came under their observation an exposure to malaria was the direct and efficient cause: and in view of the frequent incidence of the malarial poison on the intestinal canal, causing diarrhœal and dysenteric symptoms, and leaving in fatal cases only the hyperæmic lesions common to these morbid conditions, it is difficult to show that they were in error in assigning a malarial origin to certain of these diarrhœal or dysenteric cases.

Some of the confusion that has crept into the discussion of this subject has arisen from the mistake of regarding diarrhœa and dysentery as diseases *per se*, when in reality they are merely symptoms of active hyperæmic conditions of the intestines which, though often due to other causes, some of which are probably specific, may certainly arise from the malarial influence. Certainly, also, this influence may be viewed as a powerful predisposing cause of the quasi diseases in question, as in the presence of that tendency to intestinal congestion which is its frequent characteristic, minor causative conditions, of themselves incapable of overcoming the *vis conservatrix naturæ*, may readily determine the onset.

The argument suggesting that the diarrhœal cases registered as remittents were really febrile cases due to malaria, with diarrhœal or dysenteric lesions caused directly by the malarial incidence, or indirectly due to a predisposing influence exercised by the malarial poison, applies to the cases recorded as typho-malarial or typhoid-remittent. These are enumerated in notes * and † to page 420, *supra*. Their anatomical appearances were such as are consistent with the theory of an independent diarrhœa or dysentery; but since they are equally consistent in some instances with a continued malarial fever and in others with a true typho-malarial fever, there is no evidence to show that the views of the attending officers as to the presence of a febrile element of a malarious origin were erroneous.

Looking now at the relations of diarrhœa and dysentery to typhoid fever, these will be found so close in some instances that it is difficult to discriminate between the diseases not only from the clinical records but even in full view of the recorded *post-mortem* appearances.* Typhoid fever, when the intestinal symptoms attained a notable prominence, was frequently called acute or chronic diarrhœa. In the *post-mortem* records of the continued fevers some cases of this kind have been observed, to wit: Cases 304–324, in which the patches of Peyer were ulcerated, and 343–348, in which, although the condition of the patches is not stated, the character of the ulceration in the ileum is suggestive of a typhoid element.

If the cases of the diarrhœal series be examined other instances of typhoid fever erroneously registered as diarrhœa or dysentery will readily be discovered. Thus, Woodward

* Dr. J. J. Rooker, of Castleton, Ind., announced, in the *Transactions of the State Medical Society of Indiana*, Indianapolis, 1883, p. 33, the opinion that typhoid fever and camp diarrhœa are produced by the same cause, because "when we find camp diarrhœa prevailing extensively we will find typhoid fever increased in the same ratio, and vice versa," and because he found *post-mortem* in his diarrhœal cases "an inflammatory ulcerated condition of the membrane and epithelial structures of the lower intestine and also ulceration of Peyer's glands as in typhoid fever." Manifestly this opinion was based upon limited and superficial observation and inaccurate diagnosis, for the difficulties mentioned in the text occurred only in exceptional cases.

states* that certain cases of this series were really examples of some form of continued fever in which the typhoid affection of the patches of Peyer was the prominent lesion. The cases enumerated are 165, 164, 174, 210, 531, 854 and probably 836, 837 and 838. But to these must be added 141, 192, 240, 365, 461, 709 and 777, in which the ulceration of the patches of Peyer appears to leave no doubt of the presence of typhoid fever; perhaps 273 and 308 should also be added to the list. In most of these the typhoid ulceration of the patches was associated with prominent dysenteric lesions. In the two cases, 436 and 525, having a typho-malarial diagnosis, a typhoid element seems indicated by the character of the ulceration of the small intestine, and in 870, diagnosticated typhoid fever, the ulcerated agminated glands fully support the views of the attending physicians. Instances of tubercular ulceration of the patches have been excluded from the cases above mentioned. Moreover, case 600 affords an interesting example of death from pneumonic complications in a case of typhoid fever which was otherwise running a favorable course. The fever supervened while the patient was improving in hospital under treatment for a debilitated condition of system due to diarrhœa and a scrofulous constitution: rose-colored spots appeared on the thirteenth day and convalescence was apparently established on the twentieth, but some pain in the chest and muttering delirium set in and death occurred on the twenty-seventh. As the glands of Peyer in this instance were thickened but not ulcerated, the supposition that ulceration was in progress is allowable, in view of the light character of the febrile symptoms.

In addition to these twenty-two cases of typhoid the diarrhœal series presents thirty-seven cases in which at some period of the patient's hospital treatment his case was regarded as typhoid fever, seven in which typhoid pneumonia was reported and twenty in which the records show with certainty that the symptoms were of a typhoid character.

The lesions presented by the small intestine in these sixty-four cases are worthy of consideration. In four, 267, 498, 709 and 620, its condition was not stated. In twenty, or one-third of the remaining sixty cases, the intestine was ulcerated, but the state of the patches of Peyer was not recorded. These cases were 106, 189, 193, 200, 208, 242, 317, 409, 443, 476, 501, 505, 510, 513, 661, 750, 775, 812, 832 and 834. In one case, 652, the intestines were gangrenous. It is possible that the ulceration in these was simply a diarrhœal lesion, or, as in 832, probably the result in part of malarial action: but in view of the typhoid cases instanced above it is not unlikely that some of these were really cases of typhoid fever. Assuming them to be so, or even all cases of diarrhœal disease, their intimate relation clinically to typhoid fever has already been shown by the cases of true typhoid found in the diarrhœal series. Granting them on the other hand to have been all cases of typhoid, the presence of typhoid symptoms without typhoid ulceration of the patches is satisfactorily shown by the remaining thirty-nine cases. In four of these, cases 111, 263, 321 and 330, the intestine was healthy; in two, 399 and 496, intussusception only is mentioned: in two, 116 and 540, there was no ulceration; in one, 694, the ileum was thinned; in one, 344, softened: in one, 358, slate-colored: in eleven, 204, 246, 301, 372, 394, 397, 397, 624, 630, 639 and 672, congested: in four, 228, 328, 452 and 536, inflamed: in one, 332, the jejunum only was ulcerated: in one, 276, the solitary glands of a highly congested ileum were ulcerated: while in eleven, statements were made concerning the condition of the patches of Peyer,—normal in three cases, 197, 266 and 467; not swollen but pigmented in one, 366; thickened in three, 102, 204 and 385; dark in one, 388; conspicuous in one, 328, and congested in two, 425 and 427.

From this list it is manifest that a febrile action having a similarity to typhoid was present in at least thirty-two of the cases, although no implication of the patches of Peyer was observed after death. These were undoubtedly cases of acute diarrhœa or dysentery in which the deterioration of the blood caused perhaps by the primary action of a specific poison, but certainly by the accumulation of the products of metabolism during the continuance of a symptomatic or coincident fever, was followed by such clinical phenomena as have been shown to characterize typhoid fever and the prostration of acute malarial cases.

The few instances in which the patches of Peyer had undergone ulceration do not indicate that a typhoid element was present in them: for in many cases in which the mucous

* Page 141 of the Second Part of this Work.

membrane of the ileum was the site of the morbid lesion the patches of Peyer participated in the general congestion or tumefaction, thus becoming more conspicuous than usual, although the associated symptoms were simply those of an acute diarrhœa if the lesions were confined to the ileum, or of dysentery if they implicated as well the lower portion of the large intestine. The patches of Peyer in twenty-six such cases are said to have been affected;* but in no instance does the language of the reporter suggest that condition of the glands which was characteristic of fatal cases of typhoid fever. They were slightly thickened, enlarged, prominent or elevated, and with or without mention of this thickening, they were somewhat injected, congested or inflamed. Certainly *specimen* 98, Army Medical Museum, as shown on the plate facing page 300 of the Second Part of this work, illustrates a condition of the glands that may be more consistently referred to a general involvement of the mucous and submucous tissues of the ileum than to a specific irritant operating mainly on the closed glands. No suggestion of a typhoid element was offered in this case, 880 of the diarrhœal series, either by its history or its *post-mortem* appearances. "The intestines," according to Dr. LEIDY, who was the reporter, "were inflamed throughout; in the small intestine the inflammation increased in intensity towards the ileo-cæcal valve; the agminated glands were slightly thickened and dark-red with inflammation."

Moreover, in most of the many diarrhœal cases presenting that pigmentation of the patches which must be viewed as characteristic of our camp diarrhœas,† there was a congestion or slight tumefaction of the glands, or, if this was absent, the pigmentation itself indicated the antecedent existence of the congested and slightly tumefied condition.

But this tumefaction, being in its nature essentially similar to that caused by the specific irritant of typhoid fever, was prone in some aggravated cases to assume a greater resemblance to the characteristic lesion of typhoid by the establishment of the ulcerative process. Thus, in 426 the thickened patches presented a spongy appearance in their centre; in 342 and 378 they were slightly ulcerated; in 463 they showed several small ulcerations; in 226, 311, 374, 743, 748, 800 and 855 a few of the patches, generally near the valve, were ulcerated. It is possible that in some of these a typhoid element was present; but in view of the series of cases that lead up to the ulcerated condition, and in the absence of any clinical indications of typhoid, this suggestion may not be entertained. *Specimens* 600 and 601, Army Medical Museum, from case 881 of the diarrhœal series, show that these slight ulcerations of the patches in the diarrhœal cases were wholly different in their appearance from the ulcerations in fatal cases of typhoid. A photographic representation of the former specimen, facing page 302 of the Second Part of this work, gives clear evidence that the patch was tumefied merely as a part of the general affection, and that the minute ulcerations on its lower part were due to local conditions of necrobiosis consequent upon this tumefaction. In this case typhoid symptoms set in before the end, and the cause of death was reported on the hospital register as typhoid fever; but as Dr. WOODWARD observed, in speaking of its morbid lesions,—"here we have to do with a much less extensive disease of Peyer's patches than that which is characteristic of typhoid fever."

In the discussion of the *post-mortem* appearances of the patches in the continued fevers, similar congestions and tumefactions were referred to the participation of the glands in the general affection of the mucous membrane of the ileum. The facts just submitted with regard

* These cases are 133, 146, 148, 149, 154, 165, 169, 172, 182, 225, 309, 329, 346, 348, 351, 353, 354, 370, 377, 428, 488, 563, 578, 752, 791 and 871.

† Among these may be numbered the following: 126, 128, 130, 134, 135, 137, 138, 140, 142, 143, 144, 147, 150, 151, 153, 154, 155, 158, 160, 162, 166, 170, 173, 174, 175, 203, 300, 315, 335, 355, 366 and perhaps also several others, as 356, 388 and 456, in which the glands were reported as dark-colored.

to their implication in the congestions due to the irritant cause or causes of acute diarrhœa sustain the views that have been advanced as to the absence of a typhoid element in certain malarial fevers, which, nevertheless, owing to the incidence of the poison on the small intestine, presented a notable involvement of the agminated glands.

From this presentation of the facts bearing upon the connection between these diseases certain conclusions may be reached:

1. Typhoid fever was one of the direct causes of diarrhœa, owing to the ulcerative processes in the agminated glands and in the solitary glands of the ileum and cæcum, which are its anatomical characteristics.

2. Diarrhœa, as a symptom of typhoid fever due to the processes aforesaid, was sometimes regarded as an acute diarrhœa when the specific phenomena were not well developed.

3. Diarrhœa, due to other irritant causes operating on the mucous membrane of the ileum and cæcum, was sometimes regarded as typhoid fever, especially in acute cases of some persistence in which the continuance of a symptomatic or coincident fever induced the supervention of those adynamic symptoms that have been denominated typhoid.

These errors in diagnosis, due to intimate relationship on the one hand and pathological similarities on the other, were susceptible of recognition at the *post-mortem* examination, for—

4. Diarrhœa, symptomatic of typhoid, was always indicated by the condition of the patches.

5. Diarrhœa from other causes had the patches unaffected or pigmented, often congested, tumefied and even ulcerated; but these conditions were usually readily distinguishable from the congestion, tumefaction and ulceration of typhoid fever.

In many instances there were large and deep ulcerations of the intestine, but these were either chronic cases in which the history excluded all doubt as to the character of the disease, or diphtheritic cases in which an examination of the mucous membrane sufficed to determine the character of the ulceration. *Post-mortem* examination, if sufficiently exhaustive, would probably have developed a series of anatomical cases connecting the faintest reddening and thickening of the patches in diarrhœa with the well-marked tumefaction and defined ulceration of typhoid; but the clinical history of these cases would have failed to show a parallel or corresponding series connecting a simple diarrhœa at one extremity with a typhoid fever at the other. In other words:

6. Diarrhœa did not become typhoid fever by the implication of the patches; nor did typhoid symptoms depend upon their congested or ulcerated condition.

But, besides being the direct cause of a symptomatic diarrhœa, typhoid fever was otherwise associated with the intestinal flux. The frequent occurrence of antecedent typhoid in the history of diarrhœal cases, and the known ulcerated or deteriorated condition of the mucous lining in such cases, warrants the conclusion that—

7. Antecedent typhoid was an influential predisposing factor in the determination of diarrhœal attacks.

The connection of dysentery with pure or unmodified typhoid fever cannot be shown by a consideration of the cases of typhoid with dysenteric symptoms that have been recorded, because in these it is impossible to exclude the probability of a coincident malarial febrile element; but from the absence of tormina and tenesmus in the clinical history of the pure typhoid cases treated in the Seminary hospital, and from the rarity of inflammation or ulceration of the lower portion of the large intestine in the fifty typhoid cases given in the *post-mortem* records of the continued fevers,* it may be inferred that—

8. The coincidence of dysentery and pure or unmodified typhoid was an unusual occurrence.

On the other hand, the connection of dysentery with remittent and continued malarial fevers was so intimate as to lead them to be ascribed to a common cause; and in many instances this opinion was undoubtedly correct, for, as has been shown above,—

9. Malarial fever was one of the direct causes of diarrhœa, and especially of dysentery, owing to the active

* See also the analytical summary, *supra*, page 423.

hyperæmic conditions which it frequently established in any or all parts of the intestinal tract and particularly in the large intestine.

10. Diarrhœa or dysentery, as a symptom of malarial fever due to the conditions aforesaid, was sometimes regarded as an acute diarrhœa or dysentery when the paroxysmal features were not well developed.

This error of diagnosis was not susceptible of recognition by *post-mortem* examination of the intestinal lesions, for these were the same in diarrhœa and dysentery due to malarial incidence as in the diarrhœas and dysenteries due to other causes.

11. Diarrhœa or dysentery, due to malarial or other irritant or specific causes, was sometimes regarded as typhoid fever, especially in acute cases of some persistence in which the continuance of a primary symptomatic or coincident fever called forth the well-known typhoid symptoms.

This error, on the other hand, was easily recognized, for the presence of typhoid was always indicated by the condition of the agminated glands.

From what has been said it is needless to enlarge on the connection between diarrhœa and dysentery and the modified typhoid or true typho-malarial fevers that formed so large a part of the continued fever series.

12. Typho-malarial fever was a direct cause of diarrhœa, owing to the constant but often localized operation of its typhoid element and the occasional but usually more extensive action of its malarial element on the ileum and cæcum.

13. It was also, in some instances, a direct cause of dysentery, owing to the occasional incidence of its malarial element on the descending portion of the large intestine.

14. The frequent attacks of diarrhœa to which soldiers who had suffered from this fever were liable manifests the predisposing influence of both the febrile elements, but especially of the typhoid, while the frequency of dysentery as a sequel of the fever must be referred to the predisposition induced by the local action of the malarial factor.

IV.—SCURVY.

The scorbutic complications of the continued fevers require notice mainly because of their undue prominence in the medical literature of the war hitherto published. Scurvy, as will be seen hereafter, threatened on several occasions to become epidemic in certain commands, and, indeed, in 1865 the colored troops in Texas had a monthly rate of scorbutic cases which for one month exceeded the maximum of the French army in the Crimean campaign. But the references to scorbutic complications have not been restricted to camp fevers as affecting the colored troops. Their application has been general, although at no time was there any general scorbutic taint among the white troops. WOODWARD held that in the great majority of cases of camp fever the enteric symptoms were complicated by malarial and scorbutic phenomena. Acting on this belief he divided the enteric fevers of the army into three classes according as the typhoid, malarial or scorbutic elements appeared to predominate.* HUNT reported scurvy to the U. S. Sanitary Commission as one of the most common and easily recognized diseases of the army.† HAMMOND also reported on scurvy to the Commission, but his materials were drawn wholly from foreign sources, mainly from the experience of the allied armies in the Crimea, the intention being to direct the attention of our officers to the importance of preventive measures.‡ Scurvy, according to the experiences cited by him, was a formidable ally of the continued fevers.

Typhus was at that time (the winter of 1854–55) raging fiercely, and I am convinced that, if not its main cause, certainly the cause of its great mortality was the scurvy. Of twenty patients admitted during that period eighteen were usually more or less scorbutic: eight, perhaps, would be so deeply affected (as indicated by sloughing ulcers, gangrene of the mouth, general dropsy and chronic diarrhœa) as to render recovery impossible.§

Fortunately in our armies nothing of this kind was encountered. According to the statistics the most marked outbreak among the white troops was that observed in July, 1862.

* *Camp Diseases of the United States Armies*, Phila., 1863, p. 77. *Typho-malarial fever: Is it a special type of fever?*—Phila., 1876, p. 37.
† *U. S. Sanitary Commission*, New York, 1867, page 276. ‡ *Military Medical and Surgical Essays*, Phila., Pa., page 175.
§ *Experiences of a Civilian in Eastern Military Hospitals*, by PETER PINCOFFS, London, 1857, p. 25.

in the Army of the Potomac, when the hardships and privations of the Peninsular campaign culminated in the despondency which attended the seven days' fight during the retreat to Harrison's Landing. Many causes, of which a deficient dietary was but one, contributed to the deteriorated condition of that army on its arrival at the James River. An adynamia pervaded its ranks, and all febrile complaints speedily assumed a typhoid character irrespective of the presence or absence of a specific typhoid element. This tendency to a typhoid state was independent of a scorbutic cachexia, for it was seen at many periods of the war and in other armies when there was no suggestion of a scorbutic element. The deterioration of the blood in typhoid fever was evidenced in many cases by the presence of petechiæ, which sometimes in fulminant instances appeared at an early stage of the disease; in malarial fevers similar petechiæ were observed, and in the pernicious cases congestions, internal extravasations and cutaneous blotches were the rule; but these were the direct results of the typhoid and malarial poisons on the blood. It was frequently noted that deadly congestive fevers, fatal in a few hours and attended with hemorrhagic blotches, chose for their subjects the healthiest and most robust men in the command, in whom there was no thought of a scorbutic taint. As the febrile poisons are competent to account for the hemorrhagic manifestations, particularly when the adynamic tendency was strongly developed in constitutions impaired by overwork, want of sleep, exposures of all kinds and moral influences of a depressing character, it is needless to bring in a scorbutic element for their explanation. Undoubtedly, at the period mentioned, scurvy was present in the Army of the Potomac, and to a notable degree in certain regiments; but it does not appear that it operated as a complicating agency other than by increasing the tendency to adynamia. Of the fever cases that have been submitted in this work, and these cover all the reported cases that possess any value for other than purely statistical purposes, very few are noted as having been complicated with scurvy. Of three hundred and eighty-nine cases presented under the title of *Post-Mortem Records*, two cases only, 316 and 374, recorded a scorbutic appearance of the patient. Probably also starvation and scurvy were predisposing causes of death in 311 and 347, and in perhaps a few other cases which, like these, occurred in the persons of men who had been not only deprived of an anti-scorbutic diet but absolutely famished; but to argue from these that scurvy entered into the febrile cases of the war as a generally complicating element would be inadmissible.

It is allowed that a scorbutic taint existed at times in many regiments and that its influence in increasing the danger of typhoid and malarial fevers was felt in individual cases; but the facts do not appear to authorize the establishment of a class of fevers in which the scorbutic element was predominant. Such a classification is misleading, as it suggests the sloughing ulcers, gangrene of the mouth and general dropsy just cited from PINCOFFS' experiences in the hospitals at Scutari and other parts of the East. A reference to the diagram facing page 694, in which is delineated month by month the prevalence of scurvy among our white troops, will show how rare must have been a recognizable scorbutic complication. There was recorded annually one case of scurvy in every 72.5 men. It is true that when one man presents well-developed scorbutic symptoms other men, subject to the same causative influences, will also be affected to some extent; but it is questionable if our medical officers in their reports did not overestimate the frequency of well-developed scurvy by reporting under that title cases which, but for their anxiety to anticipate its outbreak, would have been regarded simply as rheumatic or diarrhœal.

The point insisted upon—the absence of a scorbutic complication in the camp fevers of the war except in rare instances of local epidemics in the field and among paroled or exchanged prisoners in the general hospitals.—is sustained by the absence from the surgical records of any general references to the indisposition of wounds to heal. This indisposition was frequently noticed in the Confederate hospitals and particularly in the Confederate prisons: but as no special mention is made of the scorbutic complication by Surgeons OTIS and HUNTINGTON in their review of the surgical work of the war, it would seem strange, indeed, if the medical part of its history were permeated with a scorbutic taint which was capable of assuming a predominance even in the presence of the typhoid and malarial poisons.

CHAPTER VI.—ON THE ERUPTIVE FEVERS.

In presenting the general statistics of the war period, as in Tables II, III and IV, and in the diagrams facing pages 14, 20 and 24, the frequency and fatality of the eruptive fevers have been specified. The following table gives a more intimate view of the statistics of these diseases:

TABLE LII.

Showing the prevalence and mortality of the Eruptive Fevers among the United States forces during the years of the war and the year following the war.

WHITE TROOPS.

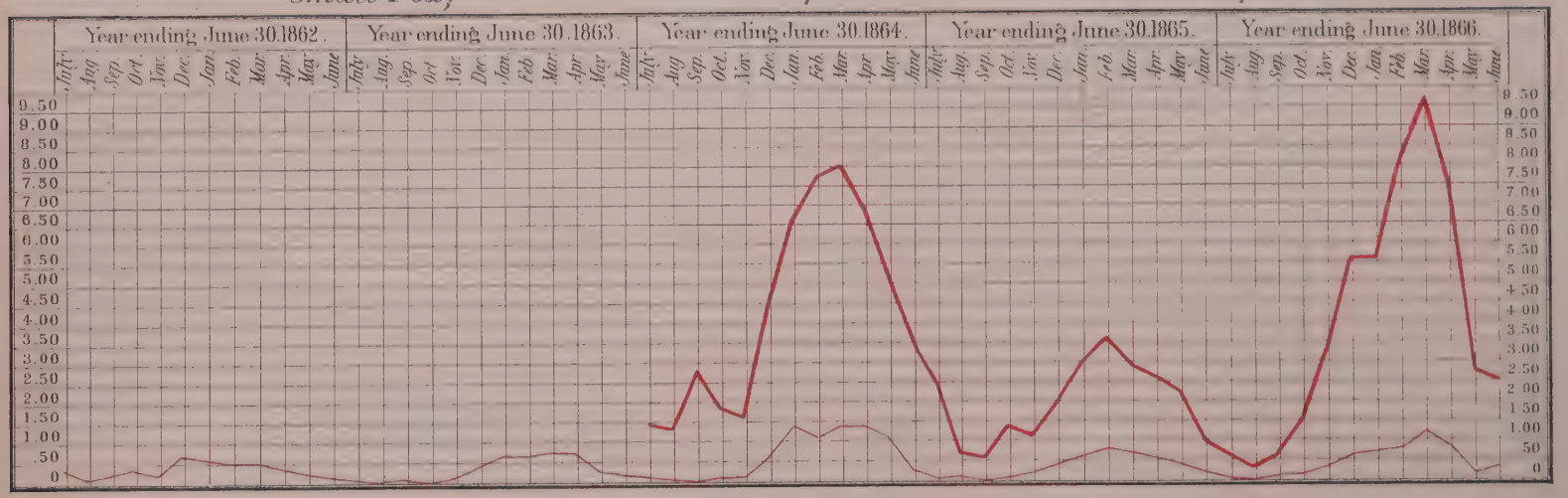
	May 1, 1861, to June 30, 1866.		1861–62.		1862–63.		1863–64.		1864–65.		1865–66.		Average annual.	
Mean strength:														
In field and garrison	431,237		279,371		614,325		619,703		574,022		99,060		431,237	
In hospital also		468,277		285,529		653,055		775,420		647,300		102,817		468,277
	Total number—		Ratios of cases and deaths per thousand of strength.											
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Small-pox	12,236	4,717	4.68	1.36	4.71	1.45	8.08	4.21	4.61	1.77	1.57	.69	4.48	1.97
Measles	67,763	4,246	77.57	1.97	28.58	1.99	28.07	1.88	17.39	1.04	1.04	.33	40.41	1.77
Scarlet fever	578	70	.48	.03	.34	.02	.25	.04	.16	.02	.08	.06	.29	.03
Erysipelas	23,276	1,860	9.49	.42	10.95	1.23	10.50	.81	11.56	.77	3.76	.19	9.47	.77
	103,853	10,893	92.22	3.78	44.58	4.69	46.90	5.74	33.06	4.22	14.20	1.00	46.61	4.50

COLORED TROOPS.

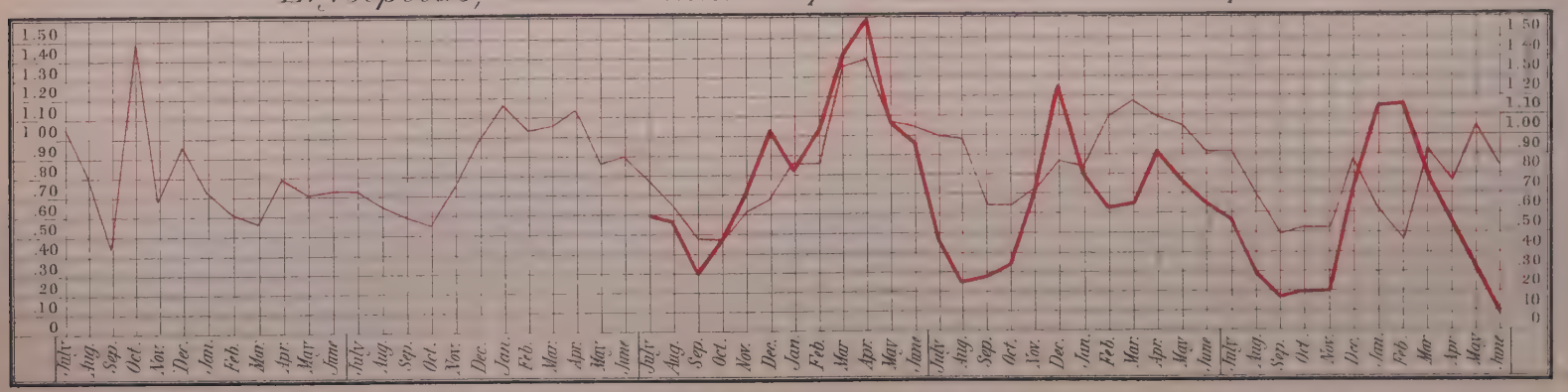
	July 1, 1866, to June 30, 1866.		1865–66.		1866–67.		1867–68.		1868–69.		Average annual.	
Mean strength:												
In field and garrison	61,132		44,786		89,571		89,143		37,000		64,126	
In hospital also		63,923		46,007		89,143		89,143		37,000		64,126
	Total number—		Ratios of cases and deaths per thousand of strength.									
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Small-pox	2,774	1,001	61.92	21.75	52.06	8.69	36.48	14.24	74.92	27.05	64.26	23.18
Measles	5,223	408	116.58	8.87	58.39	1.79	1.31	.03	4.32	.33	6.33	1.46
Scarlet fever	104	4	2.32	.08	1.45	.06					.08	.03
Erysipelas	1,109	247	24.76	5.37	1.79	1.45	1.45	.10	1.08	.10	5.79	1.37
	9,210	1,660	205.57	36.07	113.69	11.99	39.24	14.37	80.32	27.48	76.46	26.04

Diagrams showing the Monthly Rates of Prevalence of Small Pox and Erysipelas among the White and the Colored Troops per thousand of strength.

Small Pox, ——— *White Troops.* ——— *Colored Troops.*


Year ending June 30.1862.
Year ending June 30.1863.
Year ending June 30.1864.
Year ending June 30.1865.
Year ending June 30.1866.
July. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. June.
9.50 9.00 8.50 8.00 7.50 7.00 6.50 6.00 5.50 5.00 4.50 4.00 3.50 3.00 2.50 2.00 1.50 1.00 .50 0

Erysipelas, ——— *White Troops.* ——— *Colored Troops.*



These figures show, among other points which might be indicated, that small-pox and erysipelas were present to a limited extent throughout the whole of the period, the former attaining its maximum in the third year, the latter manifesting but little fluctuation in its annual rates. Measles was a disease of the early period of the war and scarlet fever an accidental occurrence. Small-pox caused 43 per cent. of the deaths from the eruptive fevers among the white troops, measles 39 per cent., erysipelas 17 and scarlet fever less than one per cent.; among the colored troops the percentages were small-pox 66.5, measles 26.5, erysipelas 7 and scarlet fever almost *nil.*

I.—SMALL-POX.

STATISTICS.—Small-pox was present to a considerable extent in the United States during the years of the war, but at no time could it be considered a prevalent disease among the white troops serving in any of the armies or departments. During the five and one-sixth years covered by the statistics 12,236 cases occurred among them, equalling an average annual rate of 5.5 per thousand men; the deaths numbered 4,717, or 1.95 annually per thousand of strength. In accordance with the figures just given the fatal cases constituted 38.5 per cent. of the whole number; but this calculation exaggerates the rate of fatality as it does not take into consideration the many cases that were taken sick at the general hospitals. A more accurate estimate of the death-rate in small-pox may be obtained by following the history of a series of cases treated in the small-pox hospitals. Of 1,166 cases examined in this connection 679 reported as unmodified small-pox furnished 274 deaths or 40.3 per cent. of the cases, and 487 cases occurring subsequent to vaccination gave 3 deaths,—a total of 277 deaths in 1,166 cases of variolous disease, or a death-rate of 23.8 per cent.

The average number of cases taken on sick report monthly was .46 per thousand men. During the warm months of the year the rate was considerably below this average, and during the cold months proportionately above it. In July, August and September the rate was never more than a few hundredths of one per thousand men. The largest wave of prevalence extended, as may be seen by the accompanying diagram, from January to April, 1864, when the maximum rate of 1.46 was attained.

This maximum was the result of no local epidemic seriously crippling a particular command, but of the occurrence of sporadic cases in all the commands. Small-pox may be said to have been present in every department during every year of the war. The number of men in the exceptional commands was too small to afford ground for objection to this general statement. There was no small-pox in the Department of the Northwest during the year 1861–62, the strength present having been 1,240 men, nor in the Department of New Mexico in 1863–64, with a strength of 4,224 men, nor in the Division of the Pacific during 1865–66, with a strength of 11,332 men.

In view of this general diffusion of the poison of the disease it is creditable to the efforts of our medical officers that there was no serious outbreak. Isolation and vaccination were recognized as efficient means of protection. Vaccination and revaccination will preserve the individual from small-pox save in exceptional cases, such as case 9, submitted below; but instances of this kind are so rare that the efficiency of the vaccine virus to protect an army from small-pox may not be called in question. Many officers could give evidence from their experience to corroborate the statements in the following reports:

Surgeon DAVID LE ROY, *9th Ill., Brownsville, Texas, Feb.* 21, 1864.—The men of this regiment, when prisoners of war at Benton Barracks, were all vaccinated, and although surrounded by small-pox, but one mild case of varioloid has occurred among them during the year that has elapsed since their vaccination.

Medical Inspector G. W. STIPP, *U. S. A., New Orleans, La., March* 20, 1864.—For some weeks previous to the date of this inspection there had been a considerable prevalence of variolous disease among the forces and the population of the country occupied by them. This was for the most part of mild type, and its further spread seemed almost wholly checked by sedulous vaccination.

That our troops were not satisfactorily protected by vaccination is evident from the statistics submitted. Instead of so many thousands of cases there should not have been so many hundreds. Regiments were raised by the various States and rushed to the front, under the successive calls of the President for men, without a thought of small-pox or vaccination. The army regulations required that every man should be vaccinated, but few of the State military authorities succeeded in fulfilling this requirement. For many years before the war there had been no systematic vaccination in the civil communities. Many of the volunteer troops had never been vaccinated; few of them had been revaccinated, for at that time the necessity of revaccination was not thoroughly appreciated by our medical men, although European experience had demonstrated its value. There was, therefore, much susceptible material in the ranks of our armies, but to give quantitative expression to this is difficult: as a rule men from rural districts had a greater susceptibility than those from cities. The appearance of small-pox in the winter of 1861–62 caused Medical Director TRIFLER to call for a report of the condition of the regiments in the Army of the Potomac as regarded their immunity from the disease. The result of the inspection showed that while some regiments were thoroughly protected, others adjoining them on the same camp ground were composed of susceptible material. Thus, of four regiments of the Third Brigade of Sumner's Division, Surgeon STIEBELING represented the 712 men of the 52d N. Y. as sufficiently protected, and Surgeon LEACH the 744 men of the 57th N. Y. as protected with the exception of 20: while Surgeon MCDERMOTT, 66th N. Y., regarded 525 of his 738 men, and Surgeon IRONBERGER, 53d Pa., 593 of his 818 men, as susceptible and requiring immediate vaccination or revaccination. Brigade Surgeon D. W. HAND, in reporting that only 28 of the 24 N. Y. required revaccination, while 315 of the 1st Minn. appeared to be insufficiently protected, explained this by the statement that the former was a New York City regiment, composed mostly of foreigners, who were protected by a previous attack of the disease or by well defined vaccination marks, and the latter, a native regiment of Western frontiersmen, whose antecedents showed neither inclination nor facilities for vaccination.

If the number of unsuccessful revaccinations in a command be regarded as an index of its extinguished susceptibility to small-pox, some idea may be obtained of the constitutional condition of our men when exposure to the disease necessitated a hurried use of the virus. Every fourth or fifth man was perhaps liable to be attacked.* In view of this suscepti-

*Surgeon C. H. WILCOX and Ass't Surgeon J. A. PETERS, 21st N. Y., state—*Buffalo Medical and Surgical Journal*, Vol. I, 1861, p. 80—that of 706 men there was evidence of previous vaccination in 644, but that more than seven years had elapsed since the previous vaccination in no less than 477 of the number. Of those who exhibited evidence of former vaccination 43 were revaccinated successfully, to wit: 11 of 167 who had been vaccinated within seven years, and 6 of 477 [illegible] in whom the failure of the attempted revaccination was due to other causes than insusceptibility. No case was reported by these medical officers as successfully revaccinated unless the vaccinia ran its characteristic course. There is a great diversity in the recorded results of revaccination, some giving so large a percentage of successes that, in the absence of a detailed account of what constituted a success, we are at liberty to suppose that by many any inflammatory appearance at the points of insertion of the virus in a man showing evidence of a previous vaccination was regarded as a true vaccinia modified by the partial protection of a primary operation. The animal matter of the crust frequently gave rise to inflammation, pustulation and scabbing of a non-specific character, which were perhaps often reported as the evidences of a protective revaccination.—See *Borius vs. Humanized Virus as affecting the prevalence and death-rate of Varioloid*, by CHARLES SMART, Surgeon U. S. A., *Medical News*, XL, Philadelphia, 1882, p. 289. Others recorded so small a percentage of successes that the use of inert crusts may be suspected. Lymph-coated points and vaccine crusts, particularly the latter, furnished to medical officers during the war were occasionally inert. It became, therefore, a common practice in vaccinating a regiment to rub together for insertion parts of two or more crusts in the hope that one at least of the combination might prove effective. Evidently the susceptibility, as determined by the use of the dried crust and long-kept lymph, and the immunity conferred by them, might frequently be called in question. But the same objections do

bility and of the wide diffusion of the disease-poison it is evident that the prompt isolation of suspected cases and the destruction by fire of all infected clothing, bedding and shelters were measures of the first consequence in restraining the spread of the disease until immunity was conferred by successful vaccination or revaccination.

The disease prevailed to a greater extent among troops in the vicinity of cities than among those in the field. Thus, during the year of greatest prevalence there were as many cases among the 30,000 men in the Department of Washington as among the 104,000 in the Army of the Potomac, and a larger number of cases than was reported by either of these commands occurred among less than 15,000 men, mostly quartered in barracks, on recruiting duty in the Northern Department. The cases reported from the Army of the Potomac were mostly due to exposure in the cities of Washington and Alexandria. The sufferers were usually men recently returned from furlough or general hospital. As soon as the disease was recognized the patient was removed to an isolated tent-ward of the division hospital, or, in the absence of a temporary pest-house for the division, the regimental surgeon established one in a suitable locality near the camp. Usually men who presented evidences of a previous attack of the disease were detailed to act as nurses.* In other commands similar precautions were taken.

Surgeon THEO. B. LASHELLS, 171*st Pa., New Berne, N. C., Feb.* 29, 1868.—By proper care in vaccinating, and isolating the cases, the spread of small-pox was speedily checked.

Surgeon J. M. CUYLER, *U. S. A., Medical Director, Fortress Monroe, Va., Jan.* 28, 1862.—A few cases of variolous disease have appeared, chiefly among recruits: but in every instance they have been at once separated from the rest and carefully watched through the course of the disease in a building, affording them every comfort, at a distance of more than a mile from the fort.

Small-pox prevailed to a greater extent among the colored troops than among the white commands. During the three years of their service 6,716 cases, with 2,341 deaths, were reported. The cases equalled an average annual rate of 36.6 per thousand of strength, the deaths a rate of 12.2; the fatal cases formed 34.9 per cent. of the whole number. The cold months of the year were those of maximum prevalence. The maximum in 1864 occurred in March, when 8.04 cases per thousand men was attained: in 1865 a maximum of 3.57 was recorded in February; in 1866 the highest rate, 9.73, was reached in March. During the first winter the prevalence of the disease was due to the operation of causes similar in character to those affecting the white troops: but the contagion had a wider diffusion and found a greater susceptibility to its action among the negroes than among the whites. The smaller rate of the second winter is the result of efforts to suppress the disease, while its prevalence in the year following the war gives expression to the carelessness which arose from anticipations of disbandment.

No case of small-pox or varioloid was reported among the 49,394 men of the Confederate Army of the Potomac during the nine months, July, 1861–March, 1862, while 380 cases occurred during this period in the United States Army opposed to it. Small-pox may, therefore, be considered as having invaded the South during the progress of the war. The *Confederate States Medical and Surgical Journal* contains nothing on this subject: but Surgeon W. A. CARRINGTON, Medical Director of the General Hospitals in the Depart-

not apply to instances in which fresh, vesicular lymph was used. Surgeon General S. OAKLEY VANDERPOEL, of New York State, issued an order, May 12, 1861, requiring regimental surgeons to vaccinate their men irrespective of the existence of scars of previous vaccinations. In his report to the Governor, January 5, 1862, he states that the spirit of this order had been generally complied with, and that up to December 1, 1861, 9,248 men had been revaccinated. His statistics show that one person in four of the whole number were found susceptible to the virus. In other words, one man in *four* was liable to suffer from the contagion of small-pox.

*The prior attack [of small-pox] is not always evident to the examination of the individual. Surgeon J. MURRAY ROGERS, Inspector of Hospitals, C. S. A., states that his hospital records contain the names of [illegible] two of the five had [illegible] attacks.—*Medical and Surgical Monthly*, I, Memphis, Tenn., 1868, p. 101.

ment of Virginia, states* that the Army of Northern Virginia received the contagion while in Maryland during the campaign which culminated in the battle of Antietam Sept. 17, 1862. In the hospitals under his charge there were treated from October, 1862, to January, 1864, 2,513 cases of variola with 1,020 deaths, giving a death-rate of 40.58, and 1,196 cases of varioloid with 39 deaths, giving a rate of 3.26 per cent.—the fatal cases thus constituting 28.5 per cent. of the total number. Surgeon CARRINGTON says:

From actual observation and investigation at the time I can definitely pronounce upon the origin and progress of small-pox in these hospitals. On Oct. 18, 1862, the first cases were brought to Richmond from Fort Delaware. Up to that time no cases had been reported here for some months in the army or among citizens. By the 31st of October twelve cases had been reported. In carefully tracing each it was determined that those from Fort Delaware did not disseminate the disease, being quarantined and avoided by all; but that soldiers from the Army of Northern Virginia had brought the disease to the hospitals, and being unconscious and unsuspected, had exposed many to it before the diagnosis was made. The army had just reached the vicinity of Winchester after evacuating Maryland, subsequent to the battle of Sharpsburg. There were but few cases from the army, and those had not been prisoners, nor had they seen any returned prisoners. These cases went to Charlottesville, Lynchburg and Richmond, at which points the malady spread, but much more rapidly and extensively at Richmond.

Surgeon J. T. GILMORE of McLaw's Division, corroborates CARRINGTON's account of the outbreak.† The first case occurred in Anderson's Georgia Brigade, while the army was reorganizing in the vicinity of Winchester, after having fallen back from Antietam. The disease did not shew itself in McLaw's command until toward the close of October, when it appeared in a soldier of the 10th Miss.; but the epidemic did not make much headway until after the battle of Fredericksburg in December. No record of its prevalence has been preserved; but that it spread extensively among the troops and the civil population is evident from its frequent importation into our prison depots by recently-captured soldiers, and particularly from the facts that have been reported by many Southern medical men concerning the efforts to suppress the epidemic. Indeed, one medical officer has stated that the Confederate Army was panic stricken by the spread of the disease.‡

Small-pox was not a prominent disease in the Confederate prisons. The register of the prison hospital at Andersonville, Ga., covering the period Feb. 24, 1864, to April 17, 1865, shows the presence of 62 cases of variola, one-half of which were fatal, and of 63 of varioloid, 31 of which were fatal. Most of the cases occurred shortly after the establishment of the prison, the disease having been brought from infected Richmond prisons by transferred prisoners. The fatality of the cases of so-called varioloid may be explained by the enfeebled condition of the patients when attacked and their exposure to cold at night during the progress of their sickness. The subsidence of the disease after its introduction into this crowded pen must be attributed to the protective influence of antecedent vaccination and revaccination. Table XVII§ shows the prevalence of the eruptive fevers in the tobacco warehouses of Danville, Va. Of the 880 cases mentioned 818 were due to small-pox: 144 of these were transferred to other hospitals, and in 110 cases no disposition is recorded, leaving 564 cases, of which 159 or 28.2 per cent. terminated fatally. The number of prisoners confined at this depot is unknown.

The occurrence of small-pox at Alton, Camp Douglas, Rock Island and other depots in the Northern States has already been mentioned.‖ Some of the difficulties encountered in attempting its suppression have also been instanced, as the want of facilities for effecting isolation, the inefficiency of virus furnished for the control of the epidemic and its rein-

* As reported by JOSEPH JONES in the *Medical Volume of the U. S. Sanitary Commission Memoirs*, p. 609.
† Letter to Professor PAUL F. EVE, *St. Louis Medical Reporter*, III, 1868, p. 465.
‡ Dr. BOLTON, of Richmond, Va.,—see *Nashville Medical Journal*, I, 1867, p. 277.
§ *Supra*, page 44. ‖ *Supra*, page 46 *et seq.*

introduction by successive importations from the Confederate ranks. The following table summarizes the statistics of the prevalence and fatality of the eruptive fevers among the Confederate prisoners at the principal prison depots:

TABLE LIII.

Showing the number of cases of the Eruptive Fevers and of deaths caused by them among the Confederate prisoners of war at the principal prison depots for the period covered by the records of each prison.

	[illegible], Ill., September, 1862, to June, 1865.		Alton, Ill., September, 1862, to June, 1865.		Rock Island, Ill., February, 1864, to June, 1865.		Camp Morton, Ind., June, 1862, to June, 1865.		Johnson's Island, O., June, 1862, to June, 1865.		Camp Chase, O., February, 1864, to June, 1865.		Elmira, N. Y., July, 1864, to June, 1865.		Fort Delaware, Del., August, 1863, to June, 1865.		Point Lookout, Md., September, 1863, to June, 1865.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
[illegible]	[illegible]	618	1,797	404	1,196	379	125	3	40	6	1,265	298	1,186	363	1,537	341	466	212
[illegible]	[illegible]	100	225	60	134	18	186	42	4	———	167	13	130	15	345	74	402	71
[illegible]	5	———	———	———	2	1	———	———	———	———	1	1	———	———	3	———	4	3
[illegible]	[illegible]	[illegible]	[illegible]	73	465	38	237	40	116	11	432	50	52	10	708	57	161	47
Total	4,671	822	2,632	537	1,797	436	548	85	160	17	1,865	362	1,368	388	2,593	472	1,033	333

CONSOLIDATION OF THE STATISTICS OF THE DEPOTS.

	Total cases.	Total deaths.	Average annual rate per 1,000 of strength.		Annual death-rate per 1,000 admissions.	Percentage of fatal cases.
			Cases.	Deaths.		
[illegible]	9,830	2,624	120.4	32.1	8.0	26.7
[illegible]	2,473	393	30.3	4.8	1.2	15.9
[illegible]	15	5	0.2	———	———	33.3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	204.2	42.2	10.5	[illegible]

CLINICAL AND POST-MORTEM RECORDS.—Notes of the history and progress of small-pox cases were seldom recorded. The medical descriptive lists merely identify the patient and give dates. Only nine cases appear on the clinical records. The first is one of recovery; the others were fatal. Death occurred prior to maturation in cases 2 and 3, and during the secondary fever in cases 4–7; in 6 and 7 there was sloughing of the skin and cellular tissue; in 5 fatal syncope while the patient was on the close-stool; a mild case of the disease, 8, became suddenly fatal by implication of the larynx; in 9 the patient at the time of the attack had the scabs of recent revaccination on his arm.

CASE 1.—Private William Coy, Co. I, 97th Ohio: age 32; was admitted March 2, 1864, in the evening. Next day he had high fever and was somewhat delirious: pulse 80: tongue slightly furred and cracked and very red on the margin: bowels constipated. The papules were sparsely scattered on the face and were less numerous on the body. According to the patient's statement three days had elapsed since their first appearance; the rash affected the palate and caused soreness of throat. A gargle containing acetate of lead and morphia was used frequently; a Seidlitz powder was prescribed every three hours until the bowels moved: the body was sponged with a solution of three drachms of acetate of lead in two pints of water. On the 11th the pulse was 80 and the patient restless, although there was little

fever and no delirium or headache; there had been no pain in the back, but the hips and thighs were very sore; the tongue was cleaner but still cracked; the bowels had been moved three times; the eruption was vesicular on the face and the papules more abundant on the body and extremities. The most prominent vesicles on the face were cauterized; an effervescing draught was given every few hours and seven grains of Dover's powder at bedtime. Next day there was a little fever; pulse 88; tongue nearly clean and less cracked; throat still very sore; eruption pustular; bowels loose; he rested well during the night. Two teaspoonfuls of the spirit of Mindererus were given every three hours; a gargle of thirty grains of chlorate of potash in four ounces of water was used frequently; half diet was given instead of low diet as before. On the 13th he complained of having rested poorly during the night; tongue clean; pulse 82; some febrile action; face swollen; throat worse; muscular prostration. Seven grains of Dover's powder were given every five hours; the gargle and spirit of Mindererus were continued. On the 14th the tongue was coated brown; pulse 92; eruption pustular; bowels regular; he had no appetite but was very thirsty, and had not rested well during the night. Five grains of Dover's powder and three of camphor were given every six hours. He had another bad night and next day some delirium but no headache; pulse 92; tongue slightly coated; bowels open; maturation proceeding favorably; the patient had no appetite but was still thirsty; he was quite hoarse but his breathing was easy. A gargle of a solution of chlorinated soda was used frequently; the effervescing draught was taken every two hours. On the 16th he was found to have rested well; pulse 90; tongue covered with a curdled whitish coat; less hoarseness; throat feeling better; appetite improved; bowels loose. The effervescing draught was given every three hours; Dover's powder at bedtime. On the 17th there was little change,—the eruption had quite subsided on the face and had just matured on the extremities. Two grains of quinine in two teaspoonfuls of whiskey were given three times daily; the Dover's powder and effervescing draught were continued. Two days later the eruption was subsiding on the extremities; there was no fever. The patient was considered convalescent and full diet was allowed.—*Pest-House, Camp Dennison, Ohio.*

Case 2.—Private Orange S. Norton, Co. E, 113th Ill.; age 21; was admitted July 17, 1863, from Lawson hospital, St. Louis, Mo., as a convalescent from typhoid fever. He was feeble and emaciated and had a persisting diarrhœa, pain in the left side and mucous expectoration mixed with blood. After a time he began to improve, and in September was able to get out of bed. In December he could walk about in the open air but was easily fatigued: he was gaining in flesh, although there was still some diarrhœa and pain in the chest. On the 24th he was vaccinated. He stated that he had never been successfully vaccinated and there was no evidence of protection. 29th: Chill; high fever; pain in head and back; nausea; prostration. 31st: High fever; less pain; slight indication of eruption on face. Gave Dover's powder; low diet. Jan. 1, 1864: Nausea; vomiting; great depression; eruption. 3d: Vesicles in great number. 4th: Symptoms violent; delirium; indications of confluence. Sent to small-pox hospital. 7th: Died comatose.—*Hospital, Quincy, Ill.*

Case 3.—Private George Roberts, Co. A, 121st Ohio; age 35; robust and of sanguine temperament; was admitted March 9, 1864, with the premonitory fever at its height and the eruption abundant on the face but undeveloped on the body or extremities. He passed a restless night and on the following day had high fever, headache and pain in the loins, dry mouth, coated tongue, red and inflamed fauces and palate, and marked conjunctivitis; pulse 104, full and bounding. He seemed careless as to his condition although answering questions promptly. The eruption on his face was papular but confluent, the entire surface being involved; it was also well developed on the extremities. A gargle of acetate of lead and morphia was given; an effervescing draught every three hours; nitrate of silver eight grains, in distilled water one ounce, was applied by a camel's-hair pencil over the whole of the face. 11th: Pulse 106, full and bounding: tongue disposed to clean: less conjunctivitis; bowels open; no appetite; eruption on face becoming vesicular: throat ulcerating. A gargle of solution of chlorinated soda a drachm and a half, and water eight ounces, was used and the effervescing draught continued. 12th: High fever and at times delirium; tongue clean but red; pulse 104; face much swollen, closing the eyes; eruption on the body abundant and confluent, covering the entire surface; vesicles on the face receding, leaving the surface nearly smooth; bowels loose; respiration deep and easy; throat much swollen; voice inaudible. He was cupped on the temples and a blister was applied to the neck and breast; Dover's powder at night; gargle and effervescing draught continued. 13th: He had rested better; pulse 136, feeble and soft; tongue very red and with a whitish fur in the middle; face much swollen; mouth dry; all the mucous membranes near the surface bleeding; troublesome phymosis; eruption stationary; some vesicles on the extremities and body; the patient's voice was gone and he lay quiet. A mixture of carbonate of ammonia fifty grains, opium six grains, whiskey five ounces and gum camphor a scruple, was given in tablespoonful doses every two hours; hot pediluvia were applied; the body was sponged with lukewarm water and the blister was reapplied to the neck and breast, it having previously refused to draw. 14th: He rested well during the night; pulse 116, fuller; tongue parched; lips dry; gurgling in trachea; epistaxis; constipation; eruption returning without pustulation; phymosis aggravated; the blister had not yet acted. The treatment was continued; Dover's powder was given at bedtime; beef-tea, egg-nog and ice were also prescribed. 15th: He had rested well; pulse unchanged; hemorrhage from the mucous membranes; respiration difficult and stertorous; less fever; swelling of the face, though desquamation was in progress, leaving a clean and smooth surface; pustules on the hands and feet slowly maturing; eruption on body again becoming vesicular; the patient picked at his head and bed-clothes; the blister had not yet acted. The treatment was continued. He died at 4 P. M.—*Pest-House, Camp Dennison, Ohio.*

Case 4.—Private Enos W. Bratcher, Co. I, 3d Ky. Cav.; age 25; was admitted March 19, 1864, with tonsillitis, and transfetred to the pest-house April 22 with a free and well-defined variolous eruption. He presented no evidence of vaccination. His general health appeared good, but he became affected with a troublesome diarrhœa soon after his admission. Dover's powder in repeated doses was prescribed. 26th: Eruption confluent upon the face. A bottle of ale daily, with chicken diet. 28th: A mixture of one ounce of collodion and one drachm of tincture of iodine

was brushed over the face. May 1: Pustules numerous over the entire body; face crusted; fever high, although the pustules were filled. Ale, milk-punch, egg-nog, chicken and beef-tea were given. 4th: Scab falling from face, leaving surface raw and red. Stimulants and nutritious diet continued. 6th: Amelioration of symptoms: appetite fair. 8th: Diarrhœa, delirium and high fever; tongue and teeth blackened with sordes. Stimulants continued. He died on the 10th.—*Madison Hospital, Ind.*

Case 5.—Private Saul M. Millhollin, Co. K, 4th Minn., while on extra duty as cook was attacked Dec. 3, 1862, with fever and headache. Quinine and Dover's powder were rejected as soon as swallowed. 5th: Severe lumbar pain: variolous eruption upon face and hands. Gave cathartic pills, followed by quinine and soda. 6th: Eruption fully developed. Gave Dover's powder in five-grain doses every four hours; low diet. 7th: Fever subsiding: pustules forming; heavy feeling in head. 8th: Sore throat; slight tumefaction on right side of neck near angle of jaw: eruption well developed, distinct; bowels costive. Gave a gargle of two scruples of alum and two grains of sulphate of morphia in four ounces of water; to be used four times a day. 9th: Right side of face much swollen: eruption nearly confluent; pain slight; bowels unmoved. Gave oil. 10th: Swelling lessened; some pustulation: throat still sore: bowels open. Gave acetate of ammonia, sweet spirit of nitre and paregoric. 11th: Swelling subsiding but patient very restless. Low diet. 12th: Patient more comfortable; throat filled with tenacious mucus: bowels costive. 13th: Pustules filling well; swelling subsiding slowly; no severe pain; bowels costive. Gave senna and rhubarb: soup and sage-tea. 14th: Bowels open; pustules running together. 16th: Fainted while on the close-stool, and died within half an hour.—*Hospital, Quincy, Ill.*

Case 6.—Private Addison R. White, Co. G, 1st Mass. Cav.; age 28; was admitted April 9, 1864, suffering from diarrhœa contracted while a prisoner after the fight at Bristow Station, Va., Oct. 14, 1863. On April 10 he had fever, headache and pain in the back. 12th: Eruption of variola; patient very feeble. Gave effervescing draught: tamarind-water; beef-tea. 14th: Extreme thirst; unable to rise from bed. Gave citric acid water: applied calamine ointment. 15th: No passage from bowels for two days; weaker; pustules no fuller than on the 12th. Gave Seidlitz powder with a double allowance of Rochelle salt; milk-punch: Dover's powder at night. 18th: Pustules umbilicated, some of an unusually large size. 20th: Secondary fever; delirium; scrotum swollen and glistening. Gave a lotion of acetate of lead. 21st: Scrotum as large as an infant's head, its under portion gangrenous. The patient was rational for a few hours on this day. He died at 10 P. M.—*Hospital, Annapolis Junction, Md.*

Case 7.—Private William T. Blackwell, Co. C, 16th Me., was received April 9, 1864, from Belle Isle, Va., where he had been imprisoned since his capture at Gettysburg, July 1, 1863. He was emaciated and weak, having lost forty-five pounds of body-weight during his captivity. He had suffered from cough, with thick offensive sputa. After having complained of pain in the head and back for several days he became feverish and a papular eruption appeared on his face and hands on the 16th. Gave effervescing draught, milk-punch and gargle of chlorate of potash. 19th: Eruption fully out, confluent; no fever; patient so weak as to be unable to talk above a whisper. Applied oxide of zinc ointment. 20th: Dyspnœa. 21st: Dyspnœa increasing; expectoration scanty; tongue dry; lips black and parched; sordes on teeth; has refused everything but milk-punch for three days. Added syrup of squill to treatment and Dover's powder at night. 22d: Respiration and expectoration improved. Took milk-punch and soft boiled egg. 24th: Eruption on face drying up; arms and legs swollen; no itching; pustules livid at base; respiration less embarrassed but patient delirious. 28th: Gave fluid extract [illegible]. May 1: Cough harassing; eight or ten offensive stools during night; expectoration muco-purulent and fetid. Gave of sulphate of morphia one grain, muriate of ammonia, powdered, gum and white sugar [illegible], [illegible] syrup of squill two ounces and water six ounces,—a teaspoonful every six hours; also tincture of opium and tincture of rhubarb of each one ounce, tincture of cinchona and compound spirit of [illegible] a teaspoonful every six hours. 2d: Swelling of arms subsiding; skin [illegible] two dark-colored and boggy patches which, on the right, had run into each other. Applied simple cerate to the limbs. 4th: Patient weaker: patches on arms becoming white in centre. Applied [illegible]. Constantly delirious. 8th: Sloughs of skin and cellular tissue removed from the arms. 9th: Rational at times but unable to speak. Died at 10 A. M.—*Hospital, Annapolis Junction, Md.*

Case 8.—Private Ezekiel Pounders, Co. E, 61st Ill.; age 24; was admitted Nov. 29, 1864, from hospital at Camp Butler, Ill., where he had a history of erysipelas, pneumonia and phlebitis [illegible]. On Jan. 12, 1865, he became affected with modified small-pox, and died February 8 of laryngitis. Until twenty-four hours before death there was no reason to apprehend a fatal result.—*Hospital, Quincy, Ill.*

Case 9.—Private Nathan Clingan, Co. A, 120th Ill.; age 22; was admitted Dec. 1, 1864, from hospital at Louisville, Ky., with an abscess in the ischio-rectal space, which [illegible]. While under treatment for this he, on the 27th [illegible], followed by fever and pain in the back and limbs, indicating an attack of varioloid. At this time the patient had on his [illegible] after his admission into hospital. On the 29th the eruption appeared on the face and the febrile symptoms became relieved. Next day he was sent to the small-pox hospital. The [illegible] confluent, but the patient was depressed. On January 5, 1865, [illegible] dyspnœa. Death took place on the 8th.—*Hospital, Quincy, Ill.*

In another case it is claimed that successful vaccination failed to protect against a subsequent exposure to small-pox; but the separation of the vaccine crust, which is instanced in proof of the success of the vaccination, occurred at so early day as to suggest a doubt concerning its true character.

Private Joseph T. Bates, Co. E, 24th N. J.; age 23; was admitted Dec. 18, 1862, with chronic rheumatism, from which he had partially recovered when, on Jan. 11, 1863, he was taken with an acute attack of articular rheumatism. On the 16th, being considerably relieved from pain, he was vaccinated along with the other inmates of the ward. He continued to improve in health. The virus took well in his case and in seven other cases. He was exposed to small-pox two or three days after vaccination. On the 28th he was taken with all the premonitory symptoms of the disease, and on February 1 was sent to the small-pox hospital. The seven other successful cases had a similar exposure to the variolous poison but have thus far escaped. That the case was one of successful vaccination there is not the least doubt, the scab falling off on the first day of the attack.*—*Satterlee Hospital, Philadelphia, Pa.*

Post-mortem appearances were noted in the two cases which follow:

Case 1.—Private Henry C. Thurman, Co. C, 6th Iowa; age 26; was admitted Feb. 4, 1865, with coryza, cough and slight fever. During his stay in hospital he had some obscure symptoms which culminated in a chill followed by suppuration in the glands of the left groin. These were open and discharging when, on April 4, he complained of great pain in the back and loins. An eruption appeared on his forehead on the 10th and spread during the next two days over his abdomen, back, legs and arms; his pulse was accelerated and weak; stomach irritable and general condition low. On the 14th there was epistaxis and vomiting of blood, sordes on the teeth and increased frequency of pulse, 130. He died next day, the vomiting continuing to the last; blood was passed from the bladder shortly before death. *Post-mortem* examination fifteen hours after death: Rigor mortis slight; cellular tissues full of serum; eruption slightly umbilicated. The lungs were congested posteriorly. The heart was flabby, its right side and large vessels filled with liquid blood and some soft and reddish-brown clots. The liver and spleen were softened. The solitary follicles were prominent and on puncture exuded a whitish serum; those near the ileo-cæcal valve presented a distinct black spot in a central depression. The kidneys appeared normal but the bladder was filled with blood.—*Douglas Hospital, Washington, D. C.*

Case 2.—Private Oliver Conkling, Co. H, 1st N. J. Admitted Feb. 15, 1863. Diagnosis: small-pox. Died on the 17th. *Post-mortem* examination five hours after death: No rigor mortis; age about 25; body completely covered with pits. About half an ounce of pus was found under the arachnoid on the left side, and this membrane appeared thick, white and opaque over the pons Varolii. The bronchial tubes and parenchyma of the posterior parts of the lungs were congested. The heart was firm and contained white fibrinous clots in all its cavities. The liver weighed ninety-four and a half ounces and was firm and mottled; the gall-bladder contained scarcely a drachm of dark bile; the spleen was flabby and light-colored. The stomach was slightly contracted; the duodenum congested and its mucous membrane thinned; the jejunum healthy; the valves of the ileum were thin and in some places nearly destroyed, its solitary follicles slightly enlarged and its agminated glands somewhat congested in the upper third; the large intestine was dilated. The kidneys weighed each eight and a half ounces and were dark and firm; the left contained a small cyst.—*Lincoln Hospital, Washington, D. C.*

References to small-pox in special sanitary reports are of rare occurrence.

Surgeon W. W. Brown, *7th N. H., St. Augustine, Fla., May* 1, 1863.—We were obliged to keep our small-pox patients in tents on the island (Tortugas), exposed to the rays of a hot sun during the day and to the heavy dews which were always present during the night. No doubt the fatality was much greater than it would have been under more favorable circumstances and in a cooler climate. In the treatment the supporting plan is the only judicious one. During the filling of the pustules, in all severe cases, the drain from the system is so great as to cause serious apprehension of the sinking of the patient from exhaustion; during the stage of maturation he needs an abundant and nourishing diet, with a liberal allowance of good wine, ale, porter or brandy. This disease, when uncomplicated, requires no medication except an occasional anodyne to allay nervous irritation and procure rest.

Surgeon Allen F. Peck, *1st N. M. Mounted Vols., Fort Stanton, New Mexico, Dec.* 31, 1862.—The idea occurred to me that if the initiatory fever could be subdued it might possibly have the effect of lessening the subsequent eruption. I therefore resolved to treat the cases with tonics from the commencement and cut short the fever if possible. Twelve cases were treated; but of this number only four were seen at the beginning of the attack. The first patient I saw had suffered from a confluent eruption for many days before he was brought in, so that I had no opportunity to test the method in his case, which terminated fatally. The second was seen about two hours after the commencement of the fever; he was suffering from intense pain in the head, back and extremities; very high fever; pulse strong, full and frequent; skin hot and dry; tongue slightly coated and bowels confined. I at once gave him fifteen grains each of sulphate of quinia and compound extract of colocynth. In the evening he was free from both fever and pain. At this time there was no appearance of eruption, nor was it developed until nearly twenty-four hours later. As the eruption advanced I gave small doses of quinine and a cayenne gargle, with good nourishment. The case progressed favorably. This treatment was adopted in the three other cases and similar results followed; it was used also in the cases that were not seen at their inception,—a number of these were confluent but all progressed favorably.

Medical Inspector F. H. Hamilton, *U. S. A., Nashville, Tenn., April* 30, 1863.—Erysipelas, abscesses and mumps are common sequelæ of variola, and the two former complications often prove fatal.

* Ass't Surgeon T. C. Wallace, 93d N. Y., has recorded—*American Medical Times*, IV, N. Y., 1862, p. 122—the case of a man in his command who, although showing the scars of two successful vaccine operations performed in childhood and again in 1858, was successfully revaccinated Dec. 24, 1861. The vesicle was fully formed, large and well filled; yet on Jan. 8, 1862, high fever was developed and two days later the patient was covered with the eruption of variola. The matter used in his case came from the Eastern Dispensary, New York City, and was perfectly good, as shown by its effects on other members of this man's company.

Surgeon THOMAS M. COOK, 101*st Ohio, near Murfreesboro, Tenn., Jan.* 12, 1863.—Into a solution of the virus dip the end of a double thread already in a common sewing or surgeon's needle, and introduce the needle as deep as the cutis vera, drawing it through till the part wet with the virus comes into the wound, in which it is left to admit of absorption. The irritation of its presence increases the circulation to the part as well as absorption from it. This made the virus effective in many cases which had previously resisted the common modes of insertion.

CHARLES P. LUTE, *Act. Ass't Surgeon, Satterlee Hospital, Philadelphia, Pa.*—On Dec. 20, 1862, a case of small-pox occurred in my ward. Headache, pain in the back, high fever and sore throat were followed on the 23d by the eruption. I vaccinated the patient along with 83 others present in the ward. The virus from a primary vaccination was used and not, as I fear is too frequently the case, that of a revaccination, which should never be used. The small-pox case was removed from my ward. I believe his vaccination was unsuccessful. Of the remaining 83 cases 6 primary vaccinations and 14 revaccinations were successful. Twelve of the successful revaccinations occurred in men who presented well-marked scars of the primary operation. From this it will be seen that revaccination is essential, and that the existence of a genuine vaccination scar is not a sufficient guarantee against small-pox. None of the inmates of the ward contracted small-pox from the case in question.

Surgeon EZRA READ, 21*st Ind., Locust Point, near Baltimore, Md., Oct.* 7, 1861.—One case of variola occurred during the month, contracted from exposure while on detached duty at Washington. At the time the patient came into hospital it was not known that he had been exposed to the contagion of variola, and consequently no precautionary measures were adopted. Nausea, vomiting, pain in the head and other premonitory symptoms were not sufficiently pronounced to arrest attention or indicate the character of the disease; and as the wards of the hospital were much crowded at the time, he was assigned a bed in the main hall leading to all the wards, where he remained during the febrile stage and until the appearance of the eruption removed all doubt concerning the nature of the case. In this location he was constantly passed by convalescents, hospital attendants and visitors, most of whom were unprotected by vaccination. After that he was removed to a separate room in the hospital, where he remained for thirty-six hours: thence to a tent in a secluded spot and subsequently to the Marine hospital on the opposite side of the Patapsco river. He is now convalescing and thought to be out of danger.

It is an interesting fact that no one thus exposed to the disease was infected. This may be regarded as indicating the absence of contagious qualities during the stage of pyrexia and incipient eruption.*

TREATMENT.—The records of the treatment of small-pox are meagre. In mild cases little was done other than to protect the patient from injurious influences. Laxatives, salines and Dover's powder were generally used during the period of pyrexia, with tonics, stimulants and concentrated nourishment after the subsidence of the secondary fever. Surgeon D. W. HAND, U. S. Vols., reported from New Berne, N. C., in 1864, that the *Sarracenia purpurea*, which grew in great abundance in the vicinity, had been faithfully tried during a period of two months, and that no beneficial effect could be ascribed to its use. Some external applications were employed to allay cutaneous irritation and prevent subsequent pitting. Generally these consisted of cooling or astringent ointments; creasote in olive oil and iodine in glycerine were also used for this purpose. Intercurrent laryngitis, pneumonia, erysipelas, abscesses and gangrenous sloughs were treated on general principles, having in view the condition of the patient's system as well as that of the affected tissues.

JOHN E. MCGIRR, of Latrobe, Ill., in a communication, Aug. 21, 1863, invited the attention of the Surgeon General to the success which attended his use of chlorate of potash in preventing suffocation during the maturation of small-pox. This subject having been referred for investigation and report to Act. Ass't Surgeon R. I. THOMAS, in charge of the small-pox hospital at Washington, D. C., the following was rendered:

I have found great difficulty in affording relief to the symptoms of suffocation during the maturative stage of the disease arising from the presence and formation of pustules on the tongue, cheeks and fauces of the patient. For this unpleasant and dangerous condition I have been in the habit of using the chlorate of potash as a gargle, with no precaution against swallowing it. I have at the same time given it internally in eight-grain doses every four hours. In every case I have directed the free use of lemonade, and when the patient preferred it, I have ordered a lemon, which has been sucked with apparent satisfaction. The result of this treatment has been to afford relief in almost every case.

I am not prepared to ascribe prophylactic powers to the chlorate of potash in the treatment of the kind of cases referred to by Dr. MCGIRR. It has been undoubtedly beneficial taken internally in small-pox when the patient had

* Surgeon SANFORD B. HUNT, U. S. Vols., is reported by Dr. ELISHA HARRIS, in his article on Vaccination, *U. S. Sanitary Commission Memoirs*, p. 149, as having written,—"Small-pox is not contagious in its early stages. If the patient be secluded at the earliest period when the disease can be recognized by the scientific eye, another and an unprotected person can sleep in the same bedding with very little danger. We have seen this tested on a large scale."

been previously reduced to a low condition by other causes, as rheumatism, typhoid fever and dysentery; but while such has been the case, I have been compelled by the urgency of the symptoms to resort to the frequent use of the probang, moistened with a strong solution of nitrate of silver, for the purpose of removing the accumulated and tenacious mucus which immediately endangered life and which the patient himself was unable to remove,—this state of things occurring frequently when the chlorate of potash had been used internally as above stated.

The result of my observation of the efficiency of this salt has led me to the conclusion that, like saline cathartics and stimulants, it is a reliable adjuvant in the treatment of small-pox and nothing more.

UNTOWARD RESULTS OF ATTEMPTED VACCINATION.

The presence of small-pox among the troops raised a demand for vaccine virus which was supplied in the form of crusts by the medical dispensaries in the Northern cities. This stock was wholly from infants, and each crust was accompanied by a certificate bearing the name of the dispensary, that of the child from whom it was procured and the date of its removal. A small percentage of the virus used was furnished by Dr. EPHRAIM CUTTER of Massachusetts, who raised crusts from the calf by vaccinating with humanized virus.

Dr. CUTTER, indeed, appears to have claimed that some of his crusts were propagations from the natural or spontaneous cow-pox. The following report of an inspection by Surgeon J. J. MILHAU, U. S. A., April 4, 1865, describes the methods by which the animal virus was procured:

I reached Woburn, Mass., March 30, and called upon EPHRAIM CUTTER, M. D., who expressed his readiness to afford me every facility for investigating the subject. As my visit was entirely unexpected there was no opportunity to make preparations that might have given me wrong impressions. I accompanied him in his rounds and visited stables in Lexington, Lincoln, North Woburn, Jamaica Plains and Brookline, personally inspecting the condition of over fifty head of cattle; twenty-nine, mostly cows, had been vaccinated and the loosened crusts were collected by Dr. C. in my presence, after which I assisted him in vaccinating fifteen other cows. All the cattle vaccinated were of good stock and healthy appearance, well fed and kept in clean, dry, well-ventilated barns.

The "natural spontaneous kine-pock" occurs but seldom in the cows of that district of country. Occasionally the doctor's attention has been called to vesicular eruptions on the teats of cows with their second or third calf; he has vaccinated other cows with the virus taken from these vesicles, but, until recently, he has failed in producing the vaccine disease in this way. He is led to believe that cows are subject to eruptions on the teats which are not always kine-pox, or that the vesicles are broken in milking and rendered too imperfect to communicate the disease. The virus which he has been using in vaccinating cattle for the propagation of crusts was originally taken from a child.

Some three weeks ago Mr. Jewett, a farmer near Lexington, noticed a vesicle on the teat of one of his cows with her third calf. Dr. CUTTER being informed of it took virus from the vesicle and introduced it into another cow, producing a characteristic vaccine vesicle, and with the lymph from this second cow Mr. Jewett and a heifer were vaccinated. I saw them both. The farmer had two fine vaccine vesicles on the arm and complained of a little constitutional disturbance; he had been vaccinated in early life. The heifer had a characteristic scab nearly ready to be detached. I think there is no room to doubt that this was actually the *kine-pock*. The original cow with the scar on the teat, the second cow with a fresh cicatrix and the heifer with the scab were all in the same stable at the time of my visit.

Early in March Dr. CUTTER found a case of spontaneous cow-pox in a cow with her second calf; the virus was tested by vaccinating two cows on Tuft's farm in Lexington and obtaining characteristic vesicles and scabs. I enclose herewith a specimen crust of the natural and spontaneous cow-pox. I examined twelve cows that had been vaccinated with this matter, and the crusts on them had the same appearance as that on the heifer above referred to, and did not differ from those on the cattle vaccinated with the virus reproduced from the child.

As the doctor now expects to furnish crusts produced by matter from the "natural and spontaneous" cow-pox, I recommend that he should put them up separately and mark them so that they may be known to the department; and I respectfully suggest that when received they may be issued to such officers as will give them a fair trial and report the result.

In vaccinating the kine Dr. CUTTER uses the lymph taken on the eighth day, or the crust collected on the twelfth or thirteenth day and rubbed down with a little water to the consistency of cream. He objects to glycerine because a physician in his neighborhood had the misfortune to spread phlegmonous erysipelas among the patients he vaccinated, a result which was attributed to some chemical change in the glycerine. In selecting matter for propagation he is necessarily very careful, as he holds himself responsible to farmers for the value of the cattle should they be injured in the operation;—this I considered a good guarantee for the purity of the virus used, particularly as the farmers are not entirely free from prejudice on the subject.

In vaccinating, fifty to seventy-five insertions of virus are made in the hairless spaces under the tail, about the perinæum and in the commissure between the hind legs; but more than half of these fail to take. A cow with seventy-five punctures will probably not give more than fifteen or twenty perfect crusts; indeed, in some cases I saw but four or five good scabs. About 2 per cent. of all the kine vaccinated refuse to take the disease, being probably protected by having had the natural pock. The crusts, which are fully formed and ready to be collected on the twelfth or thirteenth day, fall off by the fourteenth. The scabs vary much in size not only in different animals but in the same

individual. In collecting the crusts such as are perfectly formed are taken; those that have been rubbed or scratched show a peculiar lustre and are rejected; hence to obtain a number of good crusts vaccination should be performed during the season of the year when the cattle are kept quiet in stables and are not annoyed by insects. Each crust is put up in wax; this is a nice operation, as the heat used to cause adhesion must be so moderate as not to injure the virus. A tin canister filled with water of the proper temperature answers the purpose.

Lymph is collected on the eighth day by means of a capillary glass tube which is afterwards hermetically sealed.

In conclusion I would state that Dr. CUTTER devotes much of his time and attention to the subject, and personally attends to all the details; the only assistance he receives is from his wife in putting up the crusts.

About a year later, in April, 1866, a circular was issued from the Office of the Surgeon General, U. S. Army, requesting information on the extent to which vaccination had been practiced during the previous six months, the source or sources of the virus used, and an expression of opinion as to the relative value of bovine and humanized virus as well in their protective influence as in the degree of constitutional disturbance produced by each. Reports were filed by one hundred and four medical officers, but the evidence obtained, particularly that bearing on the relative value of the humanized and bovine matter, was by no means commensurate with the number of witnesses. *Eight* medical officers stated definitely their want of experience of matter derived from the cow; *seventy-four* gave no opinion on the relative merits of the two kinds of vaccine crusts; *eleven* preferred matter from kine; *nine* from man, and *two* had no predilection. Three of those who preferred the bovine vaccine acknowledged at the same time that the preference was not based on personal experience; and few of the others who expressed a similar preference could be said to have had a large experience. Surgeon JOHN E. SUMMERS, U. S. A., was perhaps the only exception. While medical inspector in 1863–65 he paid attention to this subject, and grounded his preference on the fact that sloughing ulcerations and glandular suppurations had never been in his experience traced to the use of matter from the cow. Of the nine officers who preferred humanized matter not one appears to have had more than a few cases of vaccination with the cow-crust: thus, Act. Ass't Surgeon R. H. LONGWILL, Fort Wingate, New Mexico, who objected to the virus from the cow on account of the severity of the local and constitutional effects, had used it in only three cases. The two officers who had no predilection appear to have based this opinion on the utter worthlessness of the tested crusts whether said to have been derived from the cow or from man. In fact the majority of these reports indicate a want of success in vaccinating; eleven only speak of a reasonable amount of success attending their operations. This failure was ascribed by some to the protection of previous vaccination and by others to a want of activity in the matter. Those who arraigned the quality of the matter did so on account of subsequent successful vaccination with matter from private sources; or, in a few cases, on account of the subsequent occurrence of small-pox in those who had been subjected to the operation. Ass't Surgeon C. C. GRAY, U. S. A., who distributed both kinds of crusts from the office of the Assistant Surgeon General, considered that the results in both cases were equally unsatisfactory. He was of opinion that much of the kine virus used was spurious. Ass't Surgeon C. B. WHITE, U. S. A., who, as acting medical purveyor, distributed virus from New Orleans, La., regarded that from kine as less efficient, perhaps on account of want of care in putting it up.

In the Eastern armies during the war no bad effect followed the general use of these humanized or bovine crusts; and, according to Surgeon SANFORD B. HUNT, U. S. Vols., vaccination in over 16,000 cases in the Northern Department proved harmless or effective. But in some of the Western Departments there occurred unexpected and untoward results, which were ascribed by some observers to a scorbutic or otherwise impaired condition of system and by others to an impurity in the virus, its contamination with the poison of syphilis having even been asserted.

Medical Inspector N. S. TOWNSHEND, *U. S. A., Louisville, Ky., May* 9, 1864.—Vaccination had in a majority of the regiments been thoroughly performed, but either from the bad character of the virus or the condition of the men the sores proved to be exceedingly troublesome.

Surgeon C. ALLEN, *1st Mo., Port Hudson, La., Feb.* 24, 1864.—Those men of the command not previously vaccinated were vaccinated at Benton Barracks in the month of January, 1864, with virus obtained from the medical purveyor at St. Louis. In at least one-half the cases a phlegmon of greater or less size was developed instead of the characteristic vesicles; some are still suffering from these irregular inflammatory results.

Surgeon W. H. GRIMES, *13th Kansas, Fort Smith, Ark., August*, 1864.—Owing to some peculiarity of constitution or climate, or from filthy habits, a great many citizens of this part of Arkansas are afflicted with obstinate diseases of the skin. Many of them have a kind of scabies or itch of an aggravated character which has affected them for years; others have scaly eruptions on different parts of the body; others again have old indolent ulcers or eruptive diseases of an anomalous character. On the advent of our troops many of these persons were suffering from what they called kine-pock, having been vaccinated by some surgeon for that disease. Whether the surgeon who vaccinated them used the genuine vaccine virus or the old skin diseases so modified the vaccination as to change its character I am unable to determine. The result of this vaccination or rather inoculation was in many cases a violent erysipelatous inflammation with deep abscesses, destroying the subcutaneous tissues and burrowing under the muscles of the parts affected, producing serious constitutional disturbance. Nor was the site of the inoculation alone affected; the disease showed itself in other parts with the same violence. Active antiphlogistic treatment usually subdued

the inflammation, leaving foul and ill-conditioned sores, which resisted almost every method of treatment for months. A few of those thus afflicted became crippled in their arms.

Many of the men of this regiment, without consulting the surgeon, had themselves inoculated with the matter of these nondescript sores. The consequence is that all who have been thus inoculated have been unfit for duty for weeks and months. When the disease did not affect the deeper tissues it spread over the surface, producing ulcers which in appearance and character very much resembled chancres. Indeed, so completely did they fill the characteristics of this disease that several surgeons did not hesitate to say that the patients had been inoculated with syphilis.

Large and unhealthy ulcers, with swelling and suppuration of the axillary glands, observed in some of the regiments serving in the Department of the Cumberland in June, 1863, were ascribed by Medical Inspector F. H. HAMILTON to the existence of a scorbutic taint.* In the autumn of the same year similar results followed vaccination in the encampments around St. Louis, Mo.; but in some of these, as in the 9th Iowa Cav., the men were in vigorous health and free from scurvy. Surgeon IRA RUSSELL, U. S. Vols., reported as follows concerning the results of attempted vaccination in the wards of the hospital, Benton Barracks, Mo.:

About the middle of December, 1863, the patients were vaccinated in the following manner: The surgeon in charge directed Dr. KLÜBER, the acting assistant surgeon in charge of Ward E, to vaccinate the patients of his ward from the arm of a patient who appeared to have at that time—the eighth day from its vaccination—a genuine vaccine vesicle. The duty was performed as ordered and the vesicle was excessively drained. Next day the same man was ordered into another ward for similar service, with his then irritated arm, and all the occupants of that ward received a charge in their arms of what was presumed to be vaccine lymph. On the third day the same man was taken into another ward and lent his inflamed and now purulent vaccine sore to the patients there. This was the fourth day after his vaccination. In succession days he was still kept moving through the remaining wards for the same unfortunate service to his comrades.

No bad result followed the vaccinations in Ward E, and, as subsequent inquiries proved, no abnormal result was produced in any arm except in the men who received inoculation from the purulent matter which the constantly-teased vesicle and sore supplied after fifty or more arms had been vaccinated. The greater part of all who were vaccinated after the first day, or the eighth of the stock vesicle, suffered much from local inflammation, obstinate ulcerations and lymphatic inflammations and swellings. Suppuration frequently ensued in the axillary region, and in some instances there were severe constitutional symptoms resembling those of pyæmia. Ecthymatous eruptions appeared upon the vaccinated arm and elsewhere, and when that class of pustules degenerated into open sores the edges were ragged and the ulcerations were exceedingly obstinate. These characteristics led several of the surgeons to conclude that the morbid phenomena were attributable to syphilitic inoculation.

Shortly after the occurrence of the events thus recorded small-pox spread through the wards of this hospital, and while it spared all the inmates of Ward E, where the first day's work of vaccination had been performed, the other patients—even those worst scarred and ulcerated by these recent inoculations—became affected and were transferred to the small-pox hospital. Dr. ERASTUS HAMMOND has published several of the cases that occurred at this time.†

The cases of spurious vaccination in the Department of Arkansas in 1864 were derived from the outbreak at St. Louis, Mo. Medical Director JOSEPH R. SMITH thus refers to them:

The vaccine virus furnished to the army was very unsatisfactory in its results. Very many vaccinations were unsuccessful, and some produced spurious sores followed by constitutional effects. The first cases of spurious vaccination coming under my notice occurred in the persons of recruits vaccinated at Benton Barracks and arriving in this department in May. Since [illegible] vaccinations made in the regiments in the department were followed by evil results, viz: Ulcers at the seat of inoculation and its vicinity varying in size from that of a dime to that of a dollar, difficult to heal, with hardened edges and resembling, except in size, the indurated syphilitic sore. After one or two months these ulcers were followed by constitutional effects, sometimes glandular enlargements, always debility and symptoms of a general cachexia.

I was at first of the opinion, from the appearance of the sores, that they were the result of syphilitic inoculation. Further observation, however, failed to confirm this opinion. The history of the cases was not in detail the same as in [illegible], but the possibility of [illegible] syphilis, and more frequently the most successful treatment consisted in the local use, particularly in the form of lotions. Iodide of potassium failed to produce [illegible] in combination with portions of iron it seemed to ameliorate and add to the efficacy of the latter. In some cases change of scene and air alone seemed to have the desired effect, and cases that resisted all treatment here speedily recovered on returning to their homes.

Owing to the reported syphilitic character of the vaccination sores at Benton Barracks [illegible]

* *Infra*, page 680.

† In his paper on *Vaccination in the Army*, in the *U. S. Sanitary Commission Memoirs*, pp. 145–148.

a committee, with Dr. HAMMER of St. Louis as chairman, was appointed to investigate their nature. The anomalous results were not regarded as due to the infection of syphilis.

During the progress of the investigation many cases were examined—more than 200; they were stripped and examined thoroughly and notes taken in each case. Spreading and indurated sores existed in all; but none had any symptom of secondary syphilis. The only abnormal condition was swelling with induration of the axillary glands. In secondary syphilis the glands are indurated but seldom suppurate. The sores existed in two forms,—abscess and eczema. The latter is a disease easily produced; in some individuals slight causes will occasion its development. The committee concluded, from the examination, that the condition of the patients was produced principally by irregular and improper vaccination and exercise. Many of the soldiers vaccinated themselves, using for the purpose rusty pins, irregular incisions, etc., and while the vaccination was progressing they went to drill, exercising the arms. Eighty to one hundred negroes under the charge of Dr. RUGE were affected in the same way; they were stout and healthy, but the undershirts with which they were supplied were too narrow for the arms and kept up irritation by friction. The treatment in these cases was simply to cut the undershirts and use lead-water; in eight days the sores were healed; yet these cases had been pronounced syphilitic. Many of the cases examined had been placed under specific treatment; this was ordered to be discontinued and all got well.*

Ass't Surgeon GEORGE O. SMITH, 53d Ill., reported the occurrence in December, 1863, of thirty-one cases of vaccination presenting unusual characters at Convalescent Camp, Fourth Division, Seventeenth Army Corps, Hebron, Miss. The virus was taken from the arm of a man of dissipated habits. The ulcerations on the arm and forearm had the appearance of chancres; small, hard, red pimples were observed on the face and back; the axillary glands suppurated, and most of the cases were affected with inflammation of the conjunctival and Schneiderian membranes.†

Surgeon OTTERSON, U. S. Vols., recorded anomalous results in the 18th Ind.‡ Three hundred men were vaccinated from the crust of a tardy and irregular revaccination on the arm of a convalescent from typhoid fever and pneumonia. This man, subsequent to the removal of his crust, had some rheumatic trouble and loss of power in his arms, but no cutaneous disease. Eighty of the men in whom this undesirable matter was implanted suffered, after several weeks of latency, with ulcers of the arm, congestion of the fauces and painful affections of the joints and bones. Dr. OTTERSON attributed these results to syphilitic inoculation, and in explanation assumed that the typhoid convalescent was suffering from chancre while his revaccination was in progress; but, as the regiment, during the two months succeeding its vaccination, marched three hundred miles in rainy weather and through mud and swollen streams, sore throat and rheumatic affections might have resulted from these exposures, while the deteriorated condition of the men might be held to account for local manifestations following the insertion of a non-syphilitic but morbific matter.

Surgeon GEORGE H. HUBBARD, U. S. Vols., Medical Director, Army of the Frontier, reported, November, 1863, the disablement of about five hundred men, mostly belonging to the 1st Ark., by virus taken from the arm of a deserter from the Rebel army. A Board, convened to investigate the nature of the inoculated disease, reported that—

Soon after the operation was performed the points at which the matter was inserted commenced to itch and inflame, and by the second or third day pustules were formed of a yellowish color, which rapidly increased in size and in a few days burst. In some a scab formed, but in all, by the tenth day, open ulcers yielding a thin ichorous discharge, were developed.

At the time we examined the patients some had well-marked Hunterian chancre; some had large excavated ulcers with elevated edges, but with little surrounding induration,—the centres, when not recently cauterized, were of a brownish hue;—some, whose primary ulcers were about healed, had secondary symptoms, such as swelling and ulceration of the glands in different parts of the body, while others had pain and stiffening of the joints.

The disease was brought to the 1st Ark. Vols. by deserters from the enemy, and in our opinion it is syphilis.

Dr. HUBBARD concurred in the opinion of the Board, and reported as follows:

I have no reason to believe that in any one case did this virus produce a true vaccine pustule or had any of

* See *Discussion on Vaccination*, St. Louis Medical Society, *St. Louis Medical and Surgical Journal*, II, 1865, p. 328.
† *Chicago Medical Examiner*, V, 1864, p. 218. ‡ *American Medical Times*, VI, New York, 1863, p. 267.

the protecting power of vaccination. The ulcers all possessed, in a greater or less degree, the well-established peculiarities of venereal chancre, being of a specific and progressive nature, spreading in some cases to the size of a dollar, but generally about half that size; commonly round in shape, but often irregular and usually of the depth of the true skin. All had ragged, elevated, indurated and overhanging edges, little sensitive to the touch or even to caustics, while the bottom of the ulcer (especially under these indurated edges) was excessively sensitive. All discharged dark ill-conditioned pus, which in many cases caused painful excoriation of the surrounding skin, and when transferred to other parts of the body reproduced ulcers like the original; in this way chancres were developed on the penis in several cases.

Cases precisely similar occurred in the Indian Brigade stationed at Fort Gibson in the Cherokee nation. Act. Ass't Surgeon MILLER, on duty at that post, reported as follows:—A private of the 1st Indian Home Guards, who had been successfully vaccinated by me in March, 1863, and afterwards taken prisoner by the rebels, was, in spite of his protestations, inoculated by a rebel surgeon, producing a syphilitic ulcer. Private Johnson, of the same regiment, who had previously had small-pox, was inoculated, at his own request, with the same virus, and his ulcer presents the same characteristics, except in extent, as those not so protected.

Moreover, these ulcerations have spread among the people to an alarming extent by self-inoculation. In a large proportion of the cases consecutive symptoms have appeared,—suppuration of the lymphatic glands in the axilla, sore throat, exanthematous eruptions, &c. The cases occurring among the troops have received the ordinary treatment for syphilis and generally with excellent results.

The mischief was widespread before the true character of the disease was recognized, so that few cases have had prompt abortive treatment, and many are, in consequence, permanently disabled. Nearly every case has required constitutional treatment in addition to local treatment of the chancre. The milder caustic applications proving insufficient in many cases, acid nitrate of mercury was used to clear away the indurated edges, when the ulcer usually healed rapidly under mildly stimulating applications.

But when these cases are considered in connection with those at Benton Barracks, and particularly with those common at that period in the South, some hesitation is naturally felt in pronouncing them to have been of a syphilitic nature.

Untoward results of vaccination appear to have been at one period the rule rather than the exception among civilians as well as soldiers within the Confederate lines,—so much so that for some time after the war the people, and in some instances even physicians, manifested a fear of resorting to this protective measure.* The subject was investigated by a number of medical officers whose reports were unfortunately destroyed at the capture of Richmond, but much valuable material has been preserved in journal articles published since the war by JONES, HABERSHAM, GREENE, GILMORE, STOUT, BOLTON, RAMSAY and FUQUA.†

When small-pox broke out in the Army of Northern Virginia at Fredericksburg, Va., in 1862–63, a general vaccination was ordered. In its progress the number of cases of spurious vaccinia became alarming as affecting the strength of the army. It was reported by General Lee's Inspector General that when the battle of Chancellorsville was fought in May, 1863, as many as 5,000 men were unfit for duty because of disability arising from vaccination. Numbers of these were sent to general hospital; many of the lighter cases, retained with their regiments, continued in a disabled condition for several weeks, the ulcerations which followed the insertion of the virus showing no disposition to heal. Surgeon ETHERIDGE of Dale's Brigade, reported 332 cases. Inflammation began within twenty-four hours after inoculation; a vesicle appeared in two or three days, but in some instances

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* WM. A. GREENE, in his paper cited in next note, says: "In the large cities provision is made for the vaccination of the inhabitants, but in the smaller cities and villages and in the country there is not only no such provision made but the people, and in many instances the physician, manifest a total disregard for, and even *fear* of, applying this only sure preventive of the disease. It is not uncommon to hear people say, when urged to be vaccinated, that they 'prefer small-pox to the risk of vaccination with spurious matter'; and they refer you, perhaps, to our soldiers, who suffered so much from vaccination; and that they knew such an one who had contracted small-pox when vaccination had produced a *tremendous sore*."

† *Researches upon "Spurious Vaccination," or the Abnormal Phenomena accompanying and following Vaccination in the Confederate Army during the recent American Civil War*, 1861–65; by JOSEPH JONES, *Nashville Journal of Medicine and Surgery*, N. S., Vol. II, p. 1. *Report on Spurious Vaccination in the Confederate Army*, by S. E. HABERSHAM, formerly Surgeon in the Provisional Army of the Confederate States.—*Southern Medical and Surgical Journal*, Third Series, Vol. I, Augusta, Ga., 1866–67, p. 1. *Vaccination and its Results*, by WM. A. GREENE, of Americus, Ga., *Atlanta Medical and Surgical Journal*, VIII. 1867–68, p. 241. *Spurious Vaccination in the Confederate States Army*, by J. T. GILMORE, Mobile, Ala. (formerly surgeon C. S. A.)—*St. Louis Medical Reporter*, III, 1868, p. 465. *Outlines of the History of Variolous Inoculation and Vaccination, with remarks*, by S. H. STOUT, *Atlanta Medical and Surgical Journal*, Vol. VII, 1866–67, p. 1. *Spurious Vaccination in the Confederate States Army*, by JAMES BOLTON, *Nashville Journal of Medicine and Surgery*, N. S., Vol. II, p. 277. *Abnormalities of Vaccination*, by FRANK A. RAMSAY, formerly Medical Director C. S. A.—*Medical and Surgical Monthly*, I, Memphis, Tenn., 1866, p. 140. *On the Communicability of Syphilis by Vaccination*, by WM. M. FUQUA, Appomattox County, Va.—*Richmond Medical Journal*, I, 1866, p. 508.

the eruption was pustular from the first. The ulcers which resulted closely resembled the Hunterian chancre. After several successive scabs granulation took place and purplish cicatrices were formed. Two hundred and twenty-seven cases occurred in the 44th Ga.; the virus which occasioned these was derived from a man who stated that he had been vaccinated from his wife's arm while at home on furlough. The cases in the 12th Ga., and most of those in the 21st, originated in virus furnished by the 44th. The popular impression that these sores were due to syphilitic inoculation was not entertained by the medical officers who treated them. Cold-water applications, with the occasional use of nitrate of silver, yielded the best results; antisyphilitic treatment failed entirely, having served to prolong rather than cure the disease. Secondary symptoms were not observed. Nor did these officers consider that scurvy was concerned in the production of the anomalous results. There was some tendency to scurvy in the army, but no connection could be traced between these sores and the scorbutic condition: the subjects were generally in robust and vigorous health, many having just returned from furlough. The evidence indicates as the cause of the ulcerations an inoculation with animal matter which was neither syphilitic nor vaccinal, but derived from a degeneration of the latter. In nineteen out of twenty cases the matter was taken from the arm of a comrade by some soldier or officer irrespective of the period after vaccination. Matter was often taken from beneath a scab; and large sores were in request by the men, in the belief that the size of the sore was a measure of the protection afforded against small-pox.

The Chimborazo hospital, Division No. 2, Richmond, Va., was appointed to receive cases of this kind that might be sent for treatment from the field, and its medical officers were called upon to investigate and report upon their nature. Some of the records of this hospital have been preserved, and among them are found the following cases:

1.—*P. Davidson, K, 10th Ga.;* age 17 and in good health; was vaccinated from the arm of another man Feb. 15, 1863, by Ass't Surgeon WRIGHT. His arm became very sore and in a week was useless, continuing so until he entered this hospital, May 12. There were four elevated reddened scars about an inch apart on the right arm; the axillary glands were enlarged; he had diarrhœa and his general health was bad; he had no syphilitic taint. He was given one grain of opium, five of iodide of potassium and one drachm of syrup of sarsaparilla three times daily. By July 8 his diarrhœa had subsided, but as he was exceedingly debilitated iron and quinine were given. He was returned to duty August 6.

2.—*J. S. Alford, E, 10th Ga.;* age 33; had good health until March 1, 1863, when he was vaccinated by a friend from the arm of a soldier. In three days his arm became sore and continued unhealed until his admission, July 23. There was an indolent ulcer one and a half inches in diameter at the point of vaccination, and several cicatrices on the left breast; his general health was good. He was given acetate of zinc as a wash; vegetable diet, with meat once daily. He was returned to duty August 16.

3.—*E. Davidson, K, 16th Ga.;* age 18; was vaccinated March 1, 1863. About a week later the arm became very sore and remained so until his admission, June 5. He improved till the 29th, when, having volunteered with others to defend the city from the enemy's expected attack, the marching to which he was subjected caused a relapse, and a copious eruption appeared upon the body similar to that upon the arm. Full vegetable diet was given. On July 8 abies excelsa was given three times daily. He improved. Diarrhœa, on the 28th, was treated with subnitrate of bismuth and tannic acid. By August 8 he was convalescent; on the 15th a furlough was granted for forty-five days.

4.—*G. L. Young, K, 16th Ga.;* age 20; was in good health when vaccinated in April, 1863. His arm became sore in about a week and remained so until June 15, when the eruption disappeared. Simultaneously, however, an eruption appeared upon the left leg. At this time he was admitted with chronic diarrhœa. Cod-liver oil was administered. On August 8 the characteristic eruption of rupia appeared. He was transferred to Camp Winder on the 17th.

5.—*C. Wolhop, E, 20th Ga.;* age 23; was vaccinated several times during the winter of 1862–63 by the regimental surgeon, but without success. He was admitted to this hospital March 29 for continued fever, and was vaccinated April 10 on the left arm. When returned to duty on the 25th he had a small scar on his arm. The virus was taken from a soldier who had chronic diarrhœa. About the middle of May Wolhop contracted diarrhœa, for which he was admitted June 16. He was emaciated and anæmic and his arm was very sore; at the point of vaccination there were two large elevated scabs, discharging pus, and a large secondary scab upon his forearm. He was given iodide of potassium five grains, syrup of sarsaparilla one drachm and subnitrate of bismuth ten grains three times daily, with

full diet. On the 18th he was given syrup of iodide of iron, ten drops in water, three times daily. [The disposition of this case is not stated.]

6.—*J. T. Thurman, C, 21st Ga.;* age 29 and in good condition; was vaccinated March 3, 1863, by a medical student, from a scab. He stated that every man vaccinated from this scab suffered with a sore arm similar to his own, and that nearly the whole regiment was affected. He was admitted July 3 convalescing from fever and diarrhœa. There was a large dark elevated scab about twelve lines in diameter. The usual treatment was prescribed. He improved. On the 28th vitiligo appeared. He continued to improve and on August 16 was returned to duty.

7.—*James M. Pattillo, K, 22d Ga.;* age 28 and subject to diarrhœa; was vaccinated March 20, 1863, in the left forearm from a recent pustule on the arm of another soldier. A pustule appeared, which soon became an ulcer. In May other pustules were developed on the arm and continued to discharge until July 10, when they began to dry up. He was admitted on the 20th with chronic diarrhœa; the eruption was nearly well. He was given subnitrate of bismuth ten grains and opium one-half grain in a little water three times daily, with farinaceous diet,—fried bacon once daily and a soft-boiled egg at dinner. He improved and was transferred to Camp Winder August 17.

8.—*B. F. Adams, G, 26th Ga.;* age 19; healthy; was vaccinated April 1, 1863. In three days the arm became sore and remained so about twenty days, when it healed. The sore, however, secondarily affected the axillary glands, which discharged pretty freely and remained open until he was admitted to hospital, May 9, with intermittent fever. The usual treatment was employed and full vegetable diet given. On July 8 he was given abies excelsa three times daily. He improved. On the 28th he had diarrhœa and enlarged inguinal glands. The treatment was continued. He was returned to duty August 12.

9.—*A. M. Crow, H, 35th Ga.;* age 23; was vaccinated about the middle of February, 1863, at which time he was convalescing from typhoid fever. The arm became sore and discharged for four months. He was admitted, June 7, with diarrhœa. His arm was very sore. The diarrhœa improved and the arm healed. An ulcer formed upon the left leg, which alternately became better or worse as the weather was cold or warm. The treatment was as in previous cases. On July 12 cod-liver oil was prescribed. On September 2 he was transferred to Camp Jackson.

10.—*J. W. Donald, K, 35th Ga.;* age 22 and in good health; was vaccinated Feb. 1, 1863, and in about two weeks the arm became very sore and remained so until March 1. Several pustules then appeared upon the right leg, all of which healed by May 1. On June 1, after much fatigue and loss of sleep, the wounds reopened and remained so until he was admitted, July 10. On August 8 he was given nitrate of silver ten grains, in water one ounce, to use as a wash. On the 12th, there being no improvement, cod-liver oil was prescribed. On October 5 he was put upon the syrup of iodide of iron, the stomach refusing to retain the oil. The condition of the ulcer had not improved but the patient's general health was good. Treatment was continued till the 15th without improvement. He was then furloughed for thirty days.

11.—*J. Tromerhauser, K, 44th Ga.;* age 31; was vaccinated early in March, 1863, being at the time in good health. The arm became very sore but ultimately healed. About May 3, while at Chancellorsville, the sore reopened. When admitted, July 20, 1863, for a wound of the leg received at Gettysburg, his arm was still sore. His general health was good. Vegetable diet was given but no medical treatment was required. He improved and was returned to duty August 16.

12.—*G. A. Redding, K, 44th Ga.;* age 18; had good health up to the time of vaccination, March 1, 1863. The virus was taken from the arm of a soldier. Shortly afterwards his arm became painful and a large scab formed, dried, fell off and left a deep ulcer. A new scab formed and fell off, leaving a running ulcer, and the process of scabbing went on to the time of admission, July 4, when an elevated scab was found on the arm and a number of pustules on the left shoulder and back. He was given iodide of potassium and syrup of sarsaparilla, with vegetable diet. He improved and was returned to duty August 12.

13.—*J. A. Tomberlin, E, 49th Ga.;* age 20; was vaccinated Feb. 15, 1863, and the arm became sore in a few days; he at the time had chronic diarrhœa and tonsilitis. Being attacked with pneumonia the vaccine disease became much aggravated. When admitted, June 12, there were three scars upon his arm and one large pustule on the left leg, all having the characteristic appearances of the disease. The treatment was as in the previous cases. The diarrhœa not improving by July 9, Fowler's solution in five-drop doses was given three times daily. On the 28th two additional pustules made their appearance. He was transferred cured to Camp Winder August 18.

14.—*A. A. Ireland, I, 3d N. C.;* age 17; was vaccinated on the left forearm Jan. 15, 1863, from the arm of another man; his health at the time was good. After four days a pustule was formed, which assumed a malignant character and by the tenth day had enlarged to a diameter of fourteen lines. At the end of a month seven other similar pustules appeared upon the arm nearer the body. He was admitted June 30, 1863, having eight ulcers upon the left arm with dark elevated and firmly adhering scabs. His general health was bad and he complained of lumbar pains. He was given iodide of potassium and sarsaparilla, with full vegetable diet; a poultice was applied to the arm. He was furloughed on the 16th. The man from whom Ireland was vaccinated suffered afterwards with malignant pustule.

15.—*H. M. Smith, A, 60th Ga.;* age 19; was vaccinated about the middle of June, 1863, while suffering from dyspeptic symptoms. The arm became sore in about three days. When admitted, July 5, with debility, he had an indolent ulcer at the seat of vaccination and pain in the axillary region. The usual treatment was employed, with full vegetable diet. He improved and was returned to duty August 16.

16.—*E. W. Ferree, I, 16th N. C.;* age 33; was vaccinated Feb. 14, 1863, from the arm of a soldier who appeared to be in perfect health. Ferree stated, however, that the soldier's arm became quite sore at the expiration of fifteen days. When admitted, June 30, he was much emaciated from diarrhœa, which had affected him from before the time

of vaccination. There were three scars on the left arm from pustules and two recent pustules in the formative stage on the left elbow; there was also a pustule on the left leg. Simultaneously with the recent pustules upon the arm appeared an indistinct papular eruption upon the right leg. He stated that several soldiers who had been vaccinated at the same time suffered in like manner. Iodide of potasium and syrup of sarsaparilla were administered, with vegetable diet. On July 18 syrup of iodide of iron was given, and on the 27th the ulcer of the leg was washed with a weak solution of acetate of zinc. On October 5 he was taking cod-liver oil,—the ulcer and the patient's general health were both improving. On the 24th there was some enlargement of the lymphatics of the left arm. He was returned to duty November 23.

17.—*C. P. Green, K, 16th N. C.;* age 23; was in good health when vaccinated in February, 1863. His arm continued sore until April 1, when it healed. After several weeks of severe fatigue duty the eruption reappeared on the arm and persisted. While on the march to Chancellorsville an eruption appeared upon the right leg. On August 8 the characteristic eruption of rupia occurred. He was put upon cod-liver oil. By the 18th he was convalescent and was transferred to Camp Winder.

18.—*A. B. Coffee, A, 22d N. C.;* age 21; had good health until he was vaccinated Feb. 1, 1863. The virus was taken from the arm of another soldier who appeared to be in good health. About four days afterwards the arm became inflamed and the pustule increased in size to two inches; the scabs which formed were continually rubbed off by the friction of the clothing. Ten days later the axillary glands became inflamed and livid and discharged a large quantity of matter. An abscess, lanced in May, healed up in June. When admitted, June 30, there were two scars, one healing, the other discharging pus from beneath the scab. The patient's general appearance was healthy. Iodide of potassium and syrup of sarsaparilla were given three times daily, with full diet. On July 28 the right axillary glands were discharging. Iodide of iron was given, and on August 18, being convalescent, he was transferred to Camp Winder.

19.—*J. E. Watts, A, 22d N. C.;* age 21; stated that when an infant his mother vaccinated him with a needle coated with lymph from the arm of another child. The family health was good. He refused to be vaccinated by the surgeon of the regiment; but having lent his knife to some of his comrades who used it to cut the rags binding their vaccinated arms, and himself afterwards using it to open small pimples on his leg, he became inoculated. He was admitted June 30, 1863, with a declining impetiginous eruption on the right leg; there were many scars. The muscles were well developed, but the patient complained of general weakness in the joints and there was a slight diarrhœa. The eruption returned during exercise in warm weather. He was given iodide of potassium and syrup of sarsaparilla. On July 18 he was improving.

20.—*Lindsay McDowell, I, 22d N. C.;* age 24; was vaccinated in January, 1863; the arm became sore at once, and healed only on the approach of warm weather. When admitted, June 30, 1863, there was a large elevated scar at the place of vaccination and several small ones below it; he was scorbutic. Chlorate of potash in ten-grain doses was given three times daily, with vegetable diet. On July 9 lemon-juice and a mouth-wash of tincture of myrrh in water were added to the treatment. On August 8 the disease was cured and the scurvy improving. He was returned to duty on the 17th.

21.—*W. D. Cantwell, E, 14th Ga.;* age 22; was in good condition until vaccinated in February, 1863. A few days afterwards his arm became sore and the axillary glands swollen. He was admitted July 2. His general health was then good and the sore on the arm had healed, but the axillary glands discharged copiously. He was ordered iodide of potassium five grains and syrup of sarsaparilla a drachm three times daily. On the 8th tincture of iodine was applied to the enlarged glands and repeated daily. On the 18th he was given the syrup of iodide of iron five drops in water three times daily. On the 28th the glands were still discharging and he had taken cold. Brown mixture was given with Dover's powder at night. He was returned to duty August 16.

22.—*J. H. Hunley, H, 22d N. C.;* age 29; continued well, but for some relaxation of the bowels, until the last of February, 1863, when he was vaccinated. Twenty-four hours afterwards the arm began to be painful and a pustule was formed which discharged pus, and in three weeks developed into a deep excavated ulcer which continued unhealed until the middle of June. When admitted, June 30, there was a dark, slightly elevated scab sixteen lines in diameter. He stated that the soldier from whose arm the virus was taken suffered much from the disease, and that when he left camp his arm was still very sore. Full diet was given, with syrup of iodide of iron. By July 28 he had recovered except that he was troubled with piles and diarrhœa. He improved under treatment and was transferred to Danville August 20.

23.—*J. S. Haigler, A, 22d N. C.;* age 20; had good health until about the time he was vaccinated, Feb. 1, 1863, when he had rheumatism. By the 15th his arm was very sore. On admission, June 30, to this hospital from General hospital No. 21, where he had been under treatment for diarrhœa, his appetite was good and complexion florid, but the left parotid gland was enlarged and there was a purulent discharge from the left ear; ten distinct reddish scars were clustered around the place of vaccination on the forearm and there was a similar scar above the elbow. He was treated with iodide of potassium and syrup of sarsaparilla; tincture of iodine was applied to the enlarged gland and warm water injected into the ear several times daily. He was returned to duty August 16.

24.—*T. M. Harris, C, 23d N. C.;* age 23; had good health until he was vaccinated from a crust in March, 1863. About a week afterwards erysipelatous inflammation supervened, with implication of the axillary glands. In another week the erysipelas subsided, leaving three pustules on the arm, which were healing, when, on April 25, the characteristic pustular eruption appeared upon the left leg. When admitted, June 30, the muscular system was well developed; there were three scars upon the left arm and upon the anterior aspect of the left leg was an irritable ulcer

twelve lines in diameter, with an inflammatory areola and three impetiginous-looking pustules. He was treated with iodide of potassium and sarsaparilla, a lotion of sulphate of zinc and full diet. On July 8 turpentine was applied to the ulcer and twenty drops three times daily were given internally. On the 18th, as he did not improve, he was given the syrup of iodide of iron in ten-drop doses in a little water. He was returned to duty August 18.

25.—*J. N. Adams, E, 37th N. C.;* age 33; was vaccinated March 1, 1863, at which time he had a slight diarrhœa. The virus was taken from the arm of a healthy soldier. In from four to six days a pustule formed and ulceration progressed beneath an elevated scab. In about a month other pustules formed on the same arm, which on healing left dark cicatrices, but the primary ulcer continued to discharge. Erysipelas set in June 1 on the arm. When admitted, July 17, his general health was not good; there were two suppurating ulcers on the right arm. Cod-liver oil was given, with vegetable diet and meat once daily. He was returned to duty August 16.

26.—*Jno. L. Turner, G, 5th Va. Cav.;* age 27; was vaccinated by Ass't Surgeon Moses from the arm of a soldier while in hospital at Farmville, Aug. 10, 1863, suffering from the effects of a blow and from chronic nephritis. He had been vaccinated during the winter by Ass't Surgeon J. C. Vaiden without effect. He was admitted to this hospital September 5 with pustules resembling impetigo on the left arm and leg; the pustules appeared in successive crops. Generous diet was prescribed, with cod-liver oil. On the 19th the oil was discontinued and iodide of potassium substituted. He was furloughed on the 23d for twenty days.

Surgeon S. E. Habersham communicated the result of the investigation into this anomalous vaccinia to Medical Director Carrington under date Nov. 21, 1863. His first experience of the diseased condition appears to have been obtained not from the Georgia cases above mentioned, but from the revaccination of patients already in hospital for other diseases. In some, without much inflammatory redness, a scab was formed which left an indolent ulceration. In more malignant cases the pustule became surrounded by an erysipelatous redness, a scab formed over a phagedenic ulcer, the matter from which affected other parts of the cutaneous surface, and occasionally the axillary glands became swollen and suppurated. Many of these cases were cachectic and some decidedly scorbutic. Dr. Habersham ascribed these results to the condition of the men rather than to the quality of the inoculated matter; for, to test this point, he obtained a fresh crust of known purity and efficacy and found that in three of ten cases it occasioned anomalous manifestations. This testimony shows that such results may sometimes be referred to the condition of the individual. That vaccinia might run an irregular course in broken-down constitutions can readily be understood. Cutaneous ulcerations as a result of inflammatory processes were to be expected in soldiers convalescing from typhoid fever, debilitated from chronic diarrhœa or cachectic from scurvy. But although these results occurred in three of ten cases under treatment in the Chimborazo hospital, Surgeon Habersham's generalization as to the causation of the sores in cases of so-called spurious vaccination, must be regarded as inadmissible in view of the many cases on the Chimborazo records in which it is stated in definite terms that the patient was in good health at the time of his vaccination, and the equally definite testimony to the same effect given by the medical officers on duty with the affected regiments. The records of this hospital are strongly opposed to the theory of a syphilitic origin of the sores under consideration; many of the cases remained in view for a long time but no history of secondary developments was recorded.

Dr. Habersham's report was as follows:

I have the honor to inform you that, in accordance with your order of June 29, 1863, I have received all the patients sent into this division with a "peculiar eruptive disease," supposed to be the consequence of vaccination, and herewith forward you the results of my investigation into this anomalous affection.

In compliance with an order issued from the Surgeon General's office in the month of November, 1862, general vaccination was practiced upon all soldiers as soon as they were admitted into this division, and in order to insure the full protective influence of vaccination (not anticipating any evil consequences therefrom) the order was strictly obeyed and all the patients, even those having recent scars upon them, were revaccinated. A few days after the insertion of the virus, and in many cases within twenty-four hours, the seat of puncture became very much inflamed, with a deep inflammatory blush around it, which gradually implicated, in severe cases, nearly the whole of the affected limb. A pustule rapidly formed instead of a vesicle, which very soon discharged an ichorous fluid. This fluid was, in the course of forty-eight hours, converted into a dark, mahogany-colored, irregularly-shaped scab,

prominent and firmly attached at its base. A dark-red areola of several lines in diameter, measuring from the edge of the scab, was then developed, which in turn seemed to exude an ichorous serum. This was soon converted into a scab surrounding in juxtaposition the first and presenting the appearance of a single scab. This process continued for several days, and there was often a scab one inch or two and a half in diameter. *Pari passu* with the increase of the scab the erysipelatous blush on the limb diminished, and when the blush had disappeared this scab ceased to enlarge. As this inflammatory process subsided the discharge lost its serous character and seemed to be converted into pus, which exuded from under the scab, loosening its firm attachment at its base, and thus rendering it liable to be removed prematurely by the patient in his sleep or even by the friction of his clothing. When this occurred a foul, bleeding, irregularly shaped phagedenic ulcer was revealed, with everted edges and presenting the appearance of a syphilitic phagedenic ulcer, involving the subcutaneous areolar tissue, exposing, in many cases, the muscular tissue below. The process of destruction did not end here, for the ulcer continued to increase and from the loosened edges an ichorous discharge continued to pour out from under the skin, which seemed to destroy the edges of the ulcer, thus increasing its dimensions. Wherever the ichorous pus from this ulcer touched the sound skin another pustule of a similar character was formed, in some cases reaching the size of the primary sore. This, however, was seldom the case, but a smaller ulcer generally resulted, which often healed and cicatrized before the first.

The axillary glands when the arm was affected, and the inguinal glands when the leg was the seat of the disease, sometimes became inflamed and discharged pus, presenting the microscopic characters of healthy pus. This enlargement of glands, however, did not occur in a sufficient number of cases to make it a natural sequence of the disease. Attending the early stages of the formation of the ulcer, before pus was discharged, there was always more or less pyrexia, with furred tongue and loss of appetite, these symptoms disappearing as soon as ulceration was established. In these highly aggravated cases successive crops of pustules made their appearance on the affected limb, often also upon the lower limb of the affected side, but seldom crossing the mesian line and never developing themselves upon the trunk or head.

The less malignant form of the disease resembled the first in character but not in degree. For a few days after the insertion of the virus merely a small inflamed spot was discerned, which seemed to be more the result of the injury done to the skin by the prick of the lancet than any inflammatory action resulting from a specific cause. About the fifth or sixth day a minute pustule was discerned upon a scarcely larger inflamed base. This pustule and areola gradually increased, but the diameter of the areola was not as great and there was no deep inflammatory blush upon the arm, merely a diffused redness of several inches in diameter. The same process, however, took place—an exudation of serum from the areola—which, in turn, became a crust, and which gradually increased in size, but it never reached the diameter of the more malignant type; and when it was detached by the process of ulceration, which occurred at an early period, the revealed ulcer was neither as deep nor as malignant in its appearance. The edges were not everted and there was no discharge of pus from under the edges of the ulcer; it only presented the appearance of an ordinary ulcer, showing no tendency to increase and but little to heal. Pyrexia seldom attended this form nor was the appetite impaired.

The third and mildest form of the disease made its appearance as a small pimple in from two to ten days after the introduction of the virus, which gradually formed a pustule; a dark-brown scab succeeded in from three to four days, which remained attached sometimes as long as two weeks, and when it became detached a livid or brown spot was revealed, the size of which was equal to the scab. This scar, however, was very sensitive to the touch and liable to bleed from the least friction of clothing, and when this occurred it would exude serum or blood and another scab would surely form. If the system became suddenly depressed from any cause it would almost always assume the ulcerative process and become a sloughing ulcer, which only healed with the general improvement of the system.

As thus described this disease has prevailed in the Army of Virginia, both in field and hospital. The surgeons of the Army of the Southwest report its prevalence there. It was developed in the early part of the year in a cavalry regiment in the mountains of Virginia, the colonel commanding suffering severely from the disease. In every case its origin has been traced to the introduction of vaccine virus into the system. How far an epidemic cause may have exerted its influence in its early development it is impossible even to surmise; we know, however, that it originated in Virginia at a time when our army was upon very short rations, and that many of the soldiers sent from the field at that time presented a decidedly scorbutic appearance. Many had been reduced and were broken down by exposure to the inclemency of a cold winter and the depressing influence of low diet, want of clothing and many other prolific causes of disease calculated to deprive the blood of its healthy constituents, particularly of its fatty matter. Hence, this may have produced a predisposition. In verification of this fact I will state that when it was found how frequently the disease in consideration supervened upon vaccination in this hospital in broken-down and depraved constitutions, it was deemed prudent to postpone the introduction of the virus until the patient was restored to a healthy condition by improved diet and medical treatment. At the first appearance of the evil consequences of vaccination I was inclined, with other surgeons, to believe that the virus was impure, and because of this suspicion, I threw away the matter we then had and obtained a vaccine scab from Dr. KNOX, a practitioner on Church Hill, who assured me he had used it in several cases with a perfect result.

The introduction of this virus into the arms of some ten patients resulted in the development of the disease in question in three of them, while in the remainder it produced apparently a true pustule. From this fact, and the immunity which healthy-looking men enjoyed, I was led to believe that the predisposing cause existed in a vitiated and impoverished condition of the blood and so reported in my first report, and that the introduction of pure virus into the system was the exciting cause of a latent disease. This view, I see, is also held by Surgeon FRANK A. RAMSEY of the Department of East Tennessee, in a communication on file in the office of the Surgeon General. This view I have never had reason to change, though I am aware that many men, apparently in health, have suffered from

the effects of vaccination. In one case, which I here quote, the influence of a good condition of the general system seems to have exerted a wonderfully modifying influence.*

The search for parasitic or cryptogamic vegetation, with a good microscope, revealed none. The pustule was seldom developed where parasites make their habitation, namely, in the bulbs or at the roots of the hair. The pus presented microscopic characteristics of pus globules floating in a homogeneous fluid. These globules were not as abundant as in laudable pus and not so distinctly nucleated, and were irregular in outline in some of the cases examined. This appearance of pus globules, however, often exists in healthy or laudable pus when it has been exposed to the air any length of time. In the many cases I have examined I have yet to find a patient who will acknowledge that he has had any syphilitic disease at any period of his life, though many of them have had gonorrhœa. This exemption from syphilis, however, is not strange, since it is a very uncommon disease in the rural parts of our country, the inhabitants of which comprise the very large majority of our army. We also know the tendency of the secondary form of syphilis is to develop itself on the forehead, chest, back and trunk generally, and yet no cases developed upon these parts of the body have presented themselves to my observation. Many of the patients, also, have suffered long enough to have had the tertiary form of syphilis developed, nodes, etc., and yet no such symptoms have been seen by me.

From what I can learn the army of the United States has so far escaped these evil results of vaccination. A few cases, however, originated among Federal officers in the hospital of Libby Prison. They were vaccinated in the prison by one of their surgeons from his own arm some weeks after their confinement, and presented all the characteristics of the disease as it appeared in our army. I was assured by these officers that they had neither seen nor heard of such a result of vaccination in their army. Does not this fact alone lead us to infer that its cause or origin may be traced to some abnormal condition of the blood in these cases, induced by confinement in a vitiated atmosphere, without the means of eliminating the *materies morbi* from the system by exercise and care to the function of the skin?

The classification of this disease is difficult and unsatisfactory, since it commences as a pustule and assumes often the outward form of rupia, which by all dermatologists is classified among the bullæ. If we classify it among the pustulæ we find no disease there describing it accurately, some cases resembling ecthyma, others impetigo. Inasmuch, however, as it often assumes the characteristics of chronic ecthyma, either in a mild or aggravated form, according to the healthy or unhealthy condition of the patient, I propose to name it vaccine ecthyma. Like all chronic cutaneous diseases it shows a decided tendency to return whenever the system becomes reduced from any cause, or when the patient is exposed to causes which produce an undue action in the circulation of the capillary system. An undue amount of exercise in warm weather seems to excite its appearance. This was illustrated in those soldiers supposed to be perfectly cured, and who were about to be ordered to their regiments for duty when a raid was threatened, in the month of July, upon the city of Richmond. These men were among the volunteers from the hospital to defend the city, and were marched through a hot sun some four miles to the lines at the extreme limits of the western end of the town. They returned with a new crop of pustules, which, however, healed by resolution in a short time.

Treatment.—There is every reason to believe that the disease results from a blood disease, only to be eliminated from the system by enriching the blood and supplying its deficiency of fatty matter with rich nutritious food and the judicious use of alteratives. It is vain to treat the ulcers locally, for without alterative treatment with nutritious diet all the local applications which were tried seemed to aggravate rather than improve them; but as soon as the general condition began to improve so did the ulcers. The milder cases began to improve a few weeks after admission without any treatment except dietetic in conjunction with the iodide of potash syrup iod. ferri and sarsaparilla: in others merely applying simple dressing to the ulcer was found sufficient to subdue it. Under this treatment all the cases gradually but slowly improved. In the early part of August we received a large supply of cod-liver oil, and I was thus enabled to test fully the treatment which the supposed cause of the disease naturally suggested. Some few of the patients could not digest the oil, but those who could began rapidly to improve, and many were well enough on the 18th of August to return to their regiments, whilst others were thought well enough to be transferred to their respective State hospitals, in compliance with an order issued at that time. Those who were unable to digest the oil continued the syrup iod. ferri, which was thought the best alterative indicated in their cases. Their improvement was scarcely perceptible. In the early part of September, however, another effort was made by them to take the cod-liver oil, which they were enabled to do in a little whiskey; their improvement soon became very evident to themselves, and though not yet entirely well the ulcers are rapidly granulating. No new pustules are being developed and the patients are in a fair way to recover. I have no doubt that the best remedy has been found in the cod-liver oil; and this, locally applied and internally administered, with an entire change of air and nutritious diet, will remove and eventually eradicate this obnoxious and filthy disease from the system.

From the above-mentioned facts I am led to draw the following conclusions: That the disease is pustular at its first appearance; that it resembles ecthyma in its general character; that it is but a local manifestation of a general disorder or vitiated condition of the blood; that this vitiated condition resulted from improper and spare diet, together with inattention to cleanliness, thus impairing the eliminating functions of the skin; that syphilitic virus has had no influence in producing the disease; that the morbid effects have in most of the cases resulted from a deficiency in condition, independent of any imperfection in the vaccine virus; that the disease can only be removed by those means calculated to improve the general condition and restore the healthy play of all the functions.

* See case 26 of the Chimborazo records, submitted on page 642, *supra*. Dr. HABERSHAM, in citing this case, fails to state why the man was in hospital at Farmville at the time of his vaccination. "This patient," he says, "was young, vigorous and comparatively healthy when he received this vaccine [illegible]," [illegible] the records of the [illegible] hospital [illegible] [illegible] [illegible] [illegible]

Meanwhile cutaneous ulcerations, erysipelatous inflammations and occasional swelling and suppuration of the lymphatic glands appeared in the South and Southwest as frequent results of attempted vaccination. The attention of the profession became aroused by reported instances of the inefficiency of the protection afforded by these false vaccine sores and the suspicion of syphilitic infection associated with them, together with the spread of the small-pox epidemic. A belief in the doctrine of an epidemic constitution of the atmosphere was generally accepted; but the more the subject was investigated the more apparent it became that the undesirable and unprotective results were due to impurity in the virus used.

Thus FULTON, who was engaged in growing crusts on healthy children for the use of the Confederate authorities, tested his stock by nearly 1,300 vaccinations without an abnormal result, and when, after this, it was employed by a Tennessee physician in five cases, in four of which it proved inert and in one produced a succession of scabs, he attributed this to decomposition of the crust from a faulty method of preservation. Subsequent to this he collected about eight hundred crusts from healthy children. These were distributed throughout the army, and no further reports of abnormal results were forwarded. STOUT has recorded that soldiers were vaccinated from the arms of soldiers, in many instances by themselves and even by medical officers, with no care as to the normal appearance of the vesicle or dried scab employed in the process. In many cases the operation was followed by extensive erysipelas of the arm: sometimes by phagedenic ulceration. A few lives were sacrificed, and in one instance reported to him, amputation was resorted to for the purpose of saving life. He prohibited the use of virus obtained from the arms of soldiers or of any person supposed to be in bad health. Pure virus was distributed to physicians in private practice with the request that they furnish scabs from healthy children to be used in the army. A medical officer was detailed at every hospital to scour the neighboring country in search of children on whom to propagate the virus, that a sufficient crop might be secured to avoid the necessity of using that obtained from adults.* Cases of spurious vaccination became less frequent after this, and were almost unknown during the later months of the war. Many of the unfortunate cases he regarded as dissecting wounds, putrefactive matters having been inserted along with or instead of the vaccine lymph. But he did not attribute the gradual disappearance of the anomalous results wholly to the purity of the virus; for, coincident with its use, there was in the hospitals near Atlanta a diminished tendency to erysipelas and gangrene, which led him to believe that during the previous period, when such tendencies prevailed, bad effects may have followed the inoculation of perfectly normal lymph. GREENE, as the result of his observations, considered that much of the trouble was due to vaccinating with the matter of bruised crusts. Soldiers crowded in small tents and exposed to injury from handling their muskets and accoutrements in drilling, guard and police duties, had the vesicle damaged and its natural progress interfered with by inflammatory processes which could not fail to alter the constitution of the crust. He subscribed, however, to the theory of an atmospheric influence predisposing to a morbid condition of the tissues and fluids of the body.

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* H. H. TRAVIS, in an article on *Modified Inoculation*—*New Orleans Med. and Surg. Jour.*, XIX, 1866, p. 36—relates that while he was Superintendent of Vaccination at the post of Macon, Ga., in 1864, the prevalence of small-pox and the scarcity of reliable vaccine crusts led him to have recourse to inoculation with virulent matter taken from the pock in the vesicular stage and mixed with an equal quantity of cow's milk, as practiced by certain physicians in Marseilles and Lyons seventy or [illegible] years ago. From his experience of [illegible] he concluded that the modified inoculation is as valid in its manifestations as [illegible]—[illegible] cases having had more than a single vesicle and none more than six in addition to that at the site of the puncture; that the protection [illegible] is thereby given, not communicable by mere contact; that the immunity conferred is more lasting and otherwise superior to that obtained by vaccination; and that, with the occurrence of small-pox, we are immediately supplied with an all-potent means for its repression.

Scurvy was generally exonerated by these investigators, as the civil population, living at their homes on vegetable diet, were also affected by these anomalies of vaccination. The people were as careless in their methods of vaccination as were the soldiers; matter, fresh or dried, from a sore arm appeared to have been the desideratum rather than ripe vaccine from a lymph-vesicle or the crust of a primary vaccination from the arm of a healthy child.

The impurity in the virus was held by some physicians to consist of a syphilitic contamination; but of the many cases that passed under the observation of medical men not one has been recorded in which the constitutional symptoms of undoubted syphilis have been shown as the result of the primary sores. BOLTON insisted on the presence of syphilis in some of the outbreaks, and asserted that many of the cases were so situated that their history could be preserved, and that, in these, secondary symptoms appeared, followed in due time by tertiary symptoms. "In short," his paper says, "the disease was genuine syphilis." According to his account the disease prevailed most extensively among troops from the State of Georgia, and was thought to have been traced to a soldier from that State who had been home on furlough and was said to have vaccinated himself from his wife; but although he makes positive statements concerning the syphilitic nature of the ulcerations, it does not appear that he saw any of the cases in the affected Georgia regiments,—he was engaged at the time in propagating vaccine virus on the arms of negro children on the plantations of the South. GILMORE, however, who had an opportunity of observing the cases in the Georgia brigades of Semmes and Cobb, considered that he saw enough of the disease to convince him thoroughly that the virus owed its impurity to syphilitic contamination. He accounted for the introduction of the specific impurity by a soldier who, while on furlough, was vaccinated by a woman, an inmate of a house of bad repute in Augusta, Ga. The man denied having had syphilis previous to his vaccination, and the condition of the woman who vaccinated him is acknowledged to have been unknown.

On the other hand, the testimony of the regimental medical officers, and of those on duty at the general hospital, where the more aggravated and persistent cases of this Georgia epidemic were treated, together with the yet extant records of the hospital, show that not one of the cases developed the secondary manifestations of syphilitic disease, and that, in fact, the disease was not syphilis.

The strongest evidence of the transmission of syphilis by the operation of vaccination was reported by Surgeon WILLIAM M. FUQUA, 7th Fla. In this instance it is said that the virus employed was obtained from a sailor who was suffering from primary syphilis at the time of the vaccination. Fifty-two of the men had offensive and freely-discharging ulcerations with, in some instances, swelling and suppuration of the axillary glands. Copper-colored spots appeared in two cases, the hair began to fall off in a third and a bubo, regarded as syphilitic, was developed in a fourth. Most of the patients were returned to duty after specific treatment; a few were sent to general hospital, one of whom died. The regiment was in bad condition at the time of its vaccination, one-seventh of its membership being on the sick-list with diarrhœa and malarial fevers.

Whether these cases were really syphilitic or the result of a putrefactive animal matter in cachectic individuals, some of whom may have been the subjects of syphilis irrespective of their vaccination, appears immaterial to the settlement of the general question relating to the causation of the ulcerations and occasional glandular swellings following attempted

vaccination in the South. The weight of the testimony throws the responsibility on the matter used in the vaccinations but frees it from the suspicion of syphilitic infection.

Further light is shed upon the causation of these ulcerations by the efforts of our medical officers to prevent from small-pox the Rebel soldiers held in confinement at our prison depots. Isolation and vaccination were employed; but at some of the prisons, as Alton, the spread of the disease was so rapid that the former could not be effected until after the construction of a special hospital, and the latter was unavailing from the inefficiency of the virus used.* Most of those committed to the Rock Island prison had large ugly scars which afforded no protection from the infection of small-pox. These scars were the result of attempted vaccination while in the Southern ranks.† Virus which produced no bad effects on the United States troops stationed at Camp Douglas, occasioned phagedenic, irritable or indolent ulcers when inserted into the arms of the Confederate prisoners.‡ It is evident from these results that the debilitated condition of the men, which was a subject of constant remark by our medical inspectors, was the essential in the production of the unusual sores that followed their vaccination. A report by Medical Director CHARLES S. TRIPLER, Northern Department, gives interesting testimony on this point:

Facts of interest have been developed in regard to bad results obtained from vaccine matter supposed to be impure. At an early period in the events embodied in this report rumors of virus said to be contaminated with syphilis became prevalent. These were calculated to excite serious alarm, as the evidence seemed to show that much of the virus issued for the purposes named large, painful and obstinate ulcers, exhibiting many of the marks of syphilitic disease. Whether the supervising department should on these facts be accused of carelessness as to the source of the supply of vaccine or whether the evil existing might have some other explanation, became a question I sought at once to solve.

It was evident at the outset that a few localities—Camp Douglas, Rock Island Barracks and Camp Butler—all prison depots in the State of Illinois, furnished most of the causes of complaint. Those who suffered from the supposed impure virus were rebel prisoners of war. It was at once suspected that by no chance could *all* the impure virus of any there was concentrate in these localities; that our own troops ought also to suffer somewhat in the same way, and that probably the evil might be found in the constitutional condition of the subject rather than in the vaccinal result.

Inquiries were called for to state the facts in full as to the probable poisoning by syphilis or other infection, and also to inform me as to dietetic and other causes which might tend to explain the unfortunate results. An informal and partial report from Rock Island stated, in general terms, that the same virus used indiscriminately on prisoners suffering from scorbutus and on United States troops in ordinary health produced very different results. With the latter it acted kindly and in the usual manner; with the former it produced large indolent and occasionally sloughing ulcers, sometimes indurated at the margins and chancroid in appearance.

The report made May 31, 1864, by Surgeon JOHN H. GROVE, U. S. Vols., in charge of Camp Douglas, embodies an amount of evidence which seems to prove conclusively that there was no fault in the vaccine furnished (further than its deterioration by age), but that the cause of the evil lay in the cachexia of the subjects of the vaccination. He states in brief that while a large number of the prisoners were vaccinated with ordinary results, 1,580 cases were followed by bad ulcers. These commenced on the third day with a vesicle, not umbilicated, which filled with pus; the opening became an open irritable sore, with diffuse redness, and finally degenerated into an irritable and indolent ulcer, having put in primary four stages in march. In some cases the ulcer was limited to the cuticle, in others penetrating the true skin, and in some a deep gangrenous slough occurred. Evidently this was not syphilitic. Of the whole number 668 had healed at the time of the report; 912 remained obstinately open. Those which had healed left an opaque, smooth, red, shining cicatrix. It is noteworthy that 846 prisoners of war who had been vaccinated while in the rebel service had cicatrices of this character. On these results vaccination was suspended at that post.

Surgeon GROVE's report states that the vaccine virus used was obtained upon requisitions from the medical purveyor and used at about the same time upon the United States troops (men and officers) at the garrison, without any unpleasant effects excepting in one case of an officer's wife, who was in a chlorotic condition. In this case an irritable ulcer followed, which, after about three months, yielded to treatment.

Experiments were made, by some thousands of vaccinations made with the same virus at the same time. In one case the large majority had ulcers; in the other only one experienced any unpleasant effect. It is plain that the virus did not run riot through both bodies. From other localities the same history came.

Isolated instances occurred in which patients suffering from chronic diarrhœa had ulcers, and subsequent to the publication of Surgeon GROVE's report, the cases of three recruits vaccinated at Camp Butler and then forwarded to Alton were reported to the Inspector. In these cases as in others the same phenomena were observed. The same virus produced healthy results in some and produced ulcers on the three recruits.

* See Dr. MCKEE'S statement, *supra*, page 53. † See Dr. MCKEE'S statement, *supra*, page 53. ‡ Dr. HUMPHREYS' report, *supra*, page 67.

The cause of this cachexia must be attributed to the previous exposures of the subjects. Many of these prisoners were poisoned by malaria; many more had and still have scorbutus. The prison diet in this department is sufficient in quantity, but it lacks those component parts which are essential to health. Aside from soft bread the only vegetable issued is thirty pounds of potatoes to one hundred men per diem. This is not sufficient to ward off scurvy, and so long as it is continued a mortality not creditable to our Government may be expected among our prisoners of war.

To conclude, the facts before me authorize me to report:—

1st. That the vaccine matter furnished by the purveyor is good except when rendered inert by age.

2d. That the condition of prisoners of war is so cachectic as to produce bad results from healthy vaccine virus, results which do not obtain from the same virus in healthy subjects.

3d. That the ration now issued to prisoners of war is calculated to produce and continue scurvy and other cachectic conditions.

4th. That the ration can be modified without increased expense so as to bring about a healthy condition among the prisoners.

Undoubtedly, also, at Andersonville the condition of our men sufficed to explain the evil results even if the quality of the virus employed had been beyond question.—for at this prison mosquito bites, abrasions, pricks from wood-splinters and other slight accidental injuries were in several instances followed by gangrenous ulcerations that necessitated amputation, as in cases in which a reputed vaccine was inserted. The hospital register of this prison shows that four deaths occurred in six cases of vaccination admitted from the pen, fifty deaths in ninety-six of ulcer and sixty-one deaths in one hundred of gangrene.

In conclusion, it may be said, that the anomalous results of vaccination developed during the war originated in one or both of two causative influences,—first and chiefly, an impure virus: and, secondly, a deteriorated system. The one was demonstrated by the production of evil consequences in sound and vigorous men, the other by similar consequences in cachectic individuals although the lymph used was of normal character. The impurity of the matter may be ascribed mainly to the general practice of attempting to propagate vaccinia from the crusts or inflammatory products of a revaccination sore on the arm of an adult or even, as shown by the observations of Surgeon Ira Russell at Benton Barracks, from a genuine vaccine vesicle when changed by injury into a purulent sore. The impairment of the constitution was due to a scorbutic tendency and the prostrating influences of over-fatigue, exposure, mental depression and antecedent disease.

This experience teaches the value of the army regulation requiring the vaccination or revaccination of men at the time of their enlistment, before the privations and exposures of active service have had an opportunity to affect their health. It teaches also the necessity at all times for a vaccine lymph of good stock and unimpeachable history, free from the products of abnormal vaccinal inflammation. Fortunately, since the introduction of the Beaugency stock into this country by Dr. Henry A. Martin, large armies may be protected from variola without the use of crusts. So long as this virus is preserved, charged points free from inflammatory products, and from any possible taint of syphilis, may be prepared at short notice for vaccination on a large scale. It is needless to say that the preparation of the points on which an army relies for its protection from small-pox, and from the sometimes severe effects of spurious vaccination, should be conducted under official supervision.*

* Anomalous results may attend the use of bovine virus when the crust is employed. This should never be used on account of its tendency to decomposition and liability to contain inflammatory products. T. S. Hopkins of Thomasville, Ga., speaking of vaccination with virus in the form of cones, says, in the *Bulletin of the National Board of Health*, March 4, 1882: "The result has been fearful. Nearly every one vaccinated has suffered severely from erythema or erysipelas, the arm swollen from shoulder to wrist, and the point of puncture presenting the appearance of a sloughing ulcer discharging freely sanious pus. Many of the cases have been confined to bed with high fever from five to ten days, requiring the constant application of poultices and the free use of morphia for the relief of pain." Even ivory points or quills, ostensibly coated with bovine lymph, may induce spurious results, if by pressure or other means the vesicle on the calf be made to exude an inflammatory serosity or be transformed into a purulent matrix. During variolous epidemics, when the demand for bovine virus is greatest and the necessity for pure vaccine is most severely felt, there is the greatest [illegible] and the consequent [illegible] of [illegible]. When vaccination is compulsory, whether by law or public sentiment, citizens as well as soldiers require official protection from the dangers of impure inoculation.

II.—MEASLES.

PREVALENCE AND FATALITY.—During the years covered by the statistics 37,793 cases of measles, with 4,246 deaths, were reported among the white troops, the rate of fatality having therefore been 6.27 per cent. Probably but a small part of this mortality was directly referable to the disease. In many of the regiments not one death was caused by its epidemic occurrence. Most of the mortality was the result of secondary pulmonary affections: but the mortality-rate does not express the whole of these consequences, for many deaths were placed to the account of the pneumonic lesion without a reference to the primary cause. The average annual rate of cases per thousand of strength was 30.41.—the maximum, 77.57, during the first year, the minimum, 1.98, during the last year. But these numbers represent only a part of the prevalence of the disease, for many regiments suffered while at the recruiting rendezvous before they had been mustered into the service of the United States.

Among the colored troops 8,555 cases, with 931 deaths, or 10.88 per cent. of fatal cases, were reported. The average annual rate of cases per thousand of strength was 46.65.—the maximum, 121.54, in the first year, the minimum, 5.11, in the last year of their service.

The regiments in the Confederate service also suffered from measles during the early period of their history. According to Professor PAUL F. EVE*—

> **Measles prevailed extensively in the new regiments, especially in those from the country, and greatly impeded their organization. It so diminished the effectiveness of the troops and proved so fatal in camp that companies, battalions and whole regiments had to be disbanded for a time and the men sent home.**

This statement is fully corroborated by the records of the Confederate States Army of the Potomac, which show that during the months of July, August and September, 1861, 8,617 cases of measles were reported in a maximum monthly strength of 58,360 men. One man in every seven of the command became affected during these months. After this the disease subsided; 430 cases were reported in October, 241 in November, 79 in December, 34 in January, 1862, and only 8 in February.

In examining the monthly prevalence of measles among the white and colored troops of the army the irregularity of its progress among the colored regiments appears to indicate a succession of epidemic waves involving the susceptible material of successive additions to the strength of the command. As the new men came within the influence of the contagious foci the disease spread, giving a sudden elevation to the line of prevalence, which thereafter fell until fresh additions occasioned a corresponding rise in its level. The highest rates occurred in the early months, when the command was small and unprotected by a previous attack. In subsequent periods of increased prevalence the rates, if calculated on the strength of the new regiments only, would probably have been equally high, but, calculated as they have been on a mean strength, part of which had lost its susceptibility to the disease, they are necessarily lower than those of the earlier epidemic periods. Thus, in April, 1864, 851 cases gave a rate of only 12.66 per thousand of a strength partly protected by previous attacks, while in July, 1863, 327 cases gave a rate of 27.63 per thousand of newly-recruited men. The injury to the new regiments was as great at one period as at the other, although the rates indicate a progressive decrease of prevalence in the colored command as a whole. The decline of the disease toward the close of the year 1864–65 corresponded with the cessation of recruiting and the commencement of disbandment.

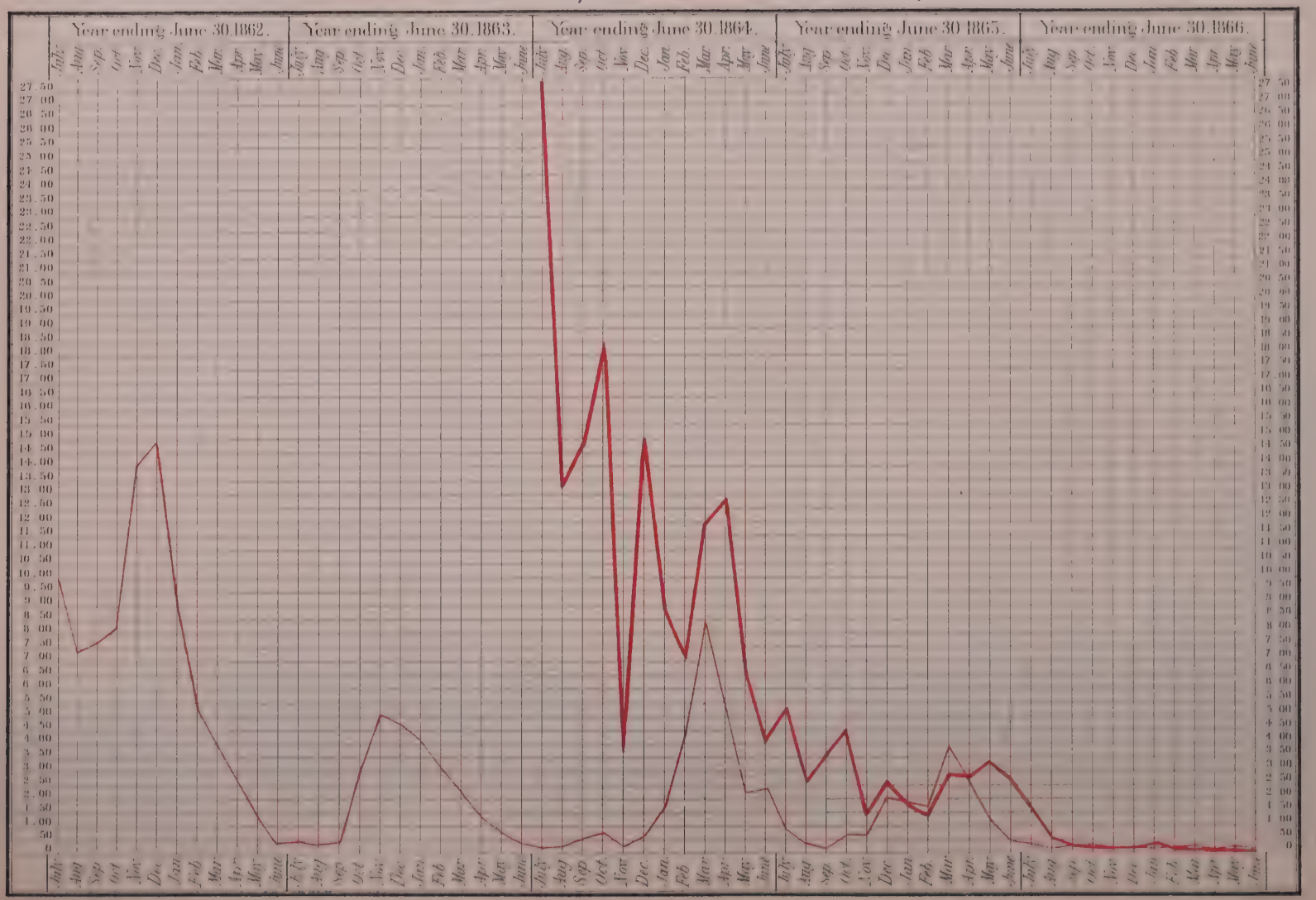
*Quoted by ROBERTS BARTHOLOW in his paper on Camp Measles—U. S. Sanitary Commission, Memoirs, N. Y., 1867, p. 26. The article cited is an excellent presentation of the clinical history, pathology and treatment of the disease, based on an analysis of one hundred cases observed at the field hospital, Chattanooga, Tenn., and Hospital No. 1, Nashville, Tenn. Its substance was reported to the Surgeon General's Office April 25, 1864.

Among the white troops, however, the line of prevalence shows a seasonal influence as well as that due to the aggregation of susceptible individuals. The white troops were levied *en masse* instead of by gradual recruitment, as was the case with the colored regiments. The highest rate of prevalence occurred during the early period of the war as the newly organized commands were being mustered into service. But while recruiting continued active in the summer of 1862, under the call of the President for more troops, as stated in discussing the irregular waves of prevalence of typhoid fever, measles declined in prevalence almost to a minimum. During each of the following summers a similar decline was observed, while each winter was marked by an increase of the disease, largest in the early months of 1864, when veteran troops were to some extent being replaced by fresh men. This influence of season, unnoted in the case of the colored troops, appears among the white troops to have outweighed that of individual susceptibility. To explain this it may be assumed either that the colored men were more susceptible to the disease or that the influence of the warm season operated less favorably on them. The annual rate of cases per thousand of strength was 30 among the white and 46 among the colored troops: but this difference, even if it indicated a greater resistance to attack on the part of the whites, is too small to account for their immunity from the disease during the summer months. The influences of the warm months must therefore have operated in a special manner for the protection of the white troops. The milder temperature was evidently not the cause of the decline of the disease, else the colored troops would have been equally benefited. It was due probably to a change in the environment of the soldier, the free ventilation and open-air life of the summer camp diluting the virulence of the specific exhalations to a degree inconsistent with the retention of contagious qualities. On the other hand, the ignorance and helplessness of the colored recruits, with a want of care on the part of those in authority over them, rendered overcrowding, defective ventilation and other insanitary conditions as common in their camps of organization in summer as in winter, and conduced to the spread of the disease among susceptible individuals irrespective of season.

The reports of medical officers show, in some instances, the manner of the introduction of the poison of measles into their commands,—the rapid development of the epidemic, its maximum having been attained in about a month and its subsidence having occupied a similar period,—its extent proportioned to the number of susceptible individuals in the camp, for efforts at isolation were seldom competent to restrain the disease,—the mild character of the epidemic when the men were subject to favorable influences,—and its severity when they were, as was too often the case, exposed to the inclemencies of the weather before, during or after the attack. In a few instances where the disease occurred among troops housed in crowded and badly ventilated buildings it became deadly in itself, the patients becoming listless or stupid and the eruption dusky or failing to appear distinctly. The virulence of the morbific agency seemed to have been intensified by concentration and the resisting powers of the system enfeebled by cachexic influences. But generally it was dangerous only from its complications or sequelæ. These usually affected the pulmonary organs, and were due to exposure to cold and wet during transportation or in poorly heated or leaky tents or quarters, to insufficiency of clothing or bedding or to sudden changes in the weather for which no adequate provision had been made. Bronchial inflammations, pneumonic congestions and solidifications, laryngeal congestions and œdema were the most prominent of the dangerous conditions; but sometimes the diseased action was manifested

Diagram showing the Monthly Rates of Prevalence of Measles among the White and the Colored Troops per thousand of strenght.

White Troops; *Colored Troops.*



on the intestinal mucous membrane. Exposures during and after convalescence were also prone to be followed by pulmonary disease, which augmented the death-rate from pneumonia and the number of discharges for disability resulting from chronic bronchitis and consumption. Moreover, in subsequent epidemics of other diseases, as of typhoid fever, those who had been prostrated by measles became more severely affected than those who had escaped the rubeolous infection.

Act. Ass't Surgeon ALFRED MULLER, *Fort Ridgeley, Minn., April* 1, 1862.—In February measles appeared in the garrison with the return from furlough of two soldiers from the lower part of the Minnesota valley, where the disease was prevailing at the time. Successively nearly all the men of the command here, who had not previously suffered from the disease, were taken sick. Most of the patients (including a great many children at this post) passed through the attack with but little treatment other than the exercise of needful caution against exposure to cold. No secondary affections commonly following this eruptive fever came under my observation.

Surgeon W. W. BROWN, *7th N. H., St. Augustine, Fla., May* 1, 1863.—Our first case of measles occurred at Manchester, N. H., in the person of a middle-aged man in whose family that disease existed at the time of his enlistment. He asserted that he had the disease in early life. About twenty men became infected by him. These had as mild an attack as could be desired and fully recovered. Our next lot of cases was larger and of a more severe type, as the weather was much colder. Nearly all of them had pneumonia, more or less severe and alarming according to the age, constitution and habits of the patients. All were immediately removed from our hospital tents to the warmer atmosphere of a house in the city; also all new cases as soon as they manifested the premonitory symptoms of the disease. Several of these assumed a typhoid character and died notwithstanding our efforts to save them. After arriving at New York and being subjected to the close quarters assigned them there, our men suffered from measles in a form that is never seen in New Hampshire in civil life. Some patients affected in the ordinary way until the eruption fully appeared, and concerning whom we were not at all apprehensive, would suddenly become listless and stupid; the eruption over the whole surface of the body assumed a dusky hue; the pulse increased in frequency and the respiration became more rapid and labored. On auscultation and percussion we found signs of congestion or hepatization. We saved some of these by active stimulation with brandy internally and rubefacients externally. In others, constituting a more hopeless class of cases, the purple color of the skin was present from the very onset. In this variety the eruption did not appear very distinctly or not until near the close of life. In all these cases a decidedly stimulating course of treatment was adopted from the first, and by great exertion some were saved that would have been lost had any other view been taken of the character of the disease. External rubefacients, such as mustard, with internal stimulants, constituted the main features of our treatment in this form.

Surgeon E. J. BONINE, *2d Mich., Upton's Hill, Va., Oct.* 4, 1862.—The only epidemic we have had was measles of a very mild type. It made its first appearance in the beginning of July and ceased about the end of August, 1861. We had altogether fifty-three cases and no deaths. There was nothing peculiar about the course or appearance of the disease; the characteristic eruption on the fauces was present in the beginning of nearly every case, and in a majority there was a slight diarrhœa. The treatment was generally diaphoretic, with laxatives when required. In some cases, probably ten, the eruption appeared after the first day's fight at Bull Run. The men walked back to Arlington through heavy rain; they suffered much from fever for some days, and, though they all recovered, effects were left which required their subsequent discharge from the service.

Surgeon C. N. CHAMBERLAIN, *10th Mass., Washington, D. C., Oct.* 1, 1861.—I am gratified in being able to state that no patient died of measles, although many of those affected were very sick and had entailed upon them the ordinary sequelæ of the disease, rendering their convalescence slow and tedious and making them peculiarly susceptible to disease under the unavoidable exposures of a soldier's life.

Surgeon M. R. GAGE, *25th Wis., Camp Randall, Wis., Dec.* 31, 1862.—Rubeola has been somewhat prevalent ever since the organization of the regiment, and although many cases have assumed a considerable degree of severity but little difficulty has been met in conducting them to a happy termination by mildly antiphlogistic measures. Nauseants and expectorants were the remedies mostly administered, with sometimes counter-irritants over the chest.

Surgeon J. M. CUYLER, *U. S. A., Medical Director, Fortress Monroe, Va., Jan.* 28, 1862.—I have also to report another invasion of rubeola, brought here by the troops of General Butler's expedition on board the transport Constitution. A ward at the general hospital has been specially prepared for cases of measles; and in order to circumscribe the disease as much as possible, all the cases brought on shore are treated there. Generally the disease is of a mild character and thus far unattended with those sequelæ which have heretofore rendered it so troublesome.

Surgeon EZRA REED, *21st Ind., Locust Point, Baltimore, Md., Oct.* 7, 1861.—During the month of September rubeola in a mild form was very prevalent; but no death was occasioned by it. Pulmonary and intestinal irritation generally coexisted, manifested by troublesome cough and diarrhœa; but in the convalescence there were no accidents and no supervening structural derangements. Altogether the recoveries have been more satisfactory than I have ever known in a like number of adults. In the treatment but little medicine was required with the exception of anodynes and astringents. The epidemic is now declining and but few cases are reported.

Ass't Surgeon H. M. SPRAGUE, *U. S. A., Alton, Ill., March* 31, 1862.—In the 13th U. S. Infantry no case of measles was severe in its primary effects. Many, however, suffered from bronchitis with marked debility, and a few seemed

to develop tuberculosis. I found the latter class to be of phthisical families and usually young and undeveloped physically. They have been discharged. In no case did pneumonia supervene upon the disease.

Surgeon JOHN G. F. HOLSTEN, *U. S. Vols., Overton Hospital, Memphis, Tenn., Nov.* 20, 1862.—All the new regiments coming down the river are affected with measles of a somewhat severe type. I find it impossible to effect perfect isolation, yet hitherto no case has been developed here.

Surgeon C. J. WALTON, 21*st Ky., March* 31, 1862.—At the beginning of the quarter the regiment was encamped about half a mile southeast of Green River bridge, in Taylor County, Ky., in a bend of the river making three-quarters of a circle one mile in diameter, on low swampy land, with a tough, clammy clay underlaid with slate-stone. The soil and clay were so impervious that, after a light shower or snow, the water stood in any little basin upon the surface for some hours, and but very little walking over the streets made a mortar sufficiently tough for building purposes. The soldiers were occupying bell tents; using water from a swampy spring; living principally upon bacon, salt pork and badly-cooked beef, with tough, heavy, hard bread, few vegetables and a good supply of coffee badly served up. They were well clothed and each had a pair of blankets. They slept upon a scanty supply of straw on the ground, without brush or boards under them. The season was unusually wet—so much so that there was scarcely one day in the week that any drilling could be done. In a word, nearly every circumstance was against the health of the camp. Our regiment was composed of about an equal number of recruits from Lexington, Ky. and vicinity, and from the Green River country. The latter, with few exceptions, had not had measles. This disease broke out among our troops at Campbellsville, Ky., before we moved to the bridge in the month of November, and raged with fearful violence, but was attended with but little mortality, leaving, as is always the case in the army, those who had had it very much debilitated and open to the invasion of such diseases as are occasioned by exposure to cold, the results of which may still be seen in abundance about our camp. Eight hundred and sixty-eight men were treated during the quarter, besides a large number of coughs, colds and trivial affections that were not entered on the record.

Surgeon LOUIS WATSON, 16*th Ill., Post Surgeon, St. Joseph, Mo., Dec.* 31, 1861.—Most of the cases of rubeola have exhibited a typhoid tendency and have been followed by bronchitis, with loss of voice, pneumonia, otitis and abscesses under the jaw. These sequelæ have been troublesome and have protracted recovery several weeks.

Surgeon JAMES M. BATES, 13*th Me., Ship Island, Miss., March* 31, 1862.—During the first half of the quarter the regiment was encamped at Augusta, Me., in the "Harding" tents, each of which was provided with a stove, with good hard dry wood as fuel. During December and January many of the men were attacked with measles, there having been during the two months one hundred and twenty-six cases. The contagion was brought into camp by one of the recruits. Many of the cases were of a severe type, accompanied with acute bronchitis and some with congestive conditions of the lungs, owing probably to exposure in camp prior to admission into hospital.

Surgeon WILLIAM HENRY THAYER, 14*th N. H., Carrollton, La., May* 4, 1864.—Measles commenced in February, 1863, and lasted till the removal to Washington in April. Some of the early cases were very severe, of typhoid character, and two were fatal. The attendant bronchitis in many lasted for weeks. It has been recently suggested that this disease arises from a cryptogamous plant growing on the straw used for bedding. Whether this theory will stand the test of further investigation may be questioned; nevertheless it is proper to state that during the winter, from December to April inclusive, straw was used for bedding, but it has not been used since then.*

Surgeon GEORGE A. SPIES, 47*th Ohio, Gauley Mount, Va., March* 31, 1862.—The regiment became infected with measles, January 16, by a soldier who had visited a friend in hospital at Summerville, where the disease was prevailing. Fifty-nine men became affected. The attack was characterized by great prostration of strength and putrescent tendency, and was complicated with bronchitis, pneumonia, diarrhœa and dysentery. At the beginning the fever was asthenic in the feeble and inflammatory in the more robust. It is remarkable that all the patients were Americans; no European was affected, although the regiment consists of Americans and Europeans in equal number. Probably most of the latter had already suffered from the disease, as the exanthem in Europe is chiefly seen among children and young persons.

Medical Inspector G. K. JOHNSON, *U. S. A., Baltimore, Md., April* 23, 1864.—An unusual mortality from measles occurred in February in the Mansfield hospital, Morehead City, N. C. There were thirty-seven admissions for this disease in that month and the latter part of January. All the cases progressed favorably until February 17. At that time the weather became intensely cold, and, as the supply of wood was deficient, the wards could not be kept properly warm. A number of cases at once assumed a bad character and eight died soon after. Autopsies revealed in two instances pulmonary congestion and inflammation, and, in four, intense inflammation of the intestinal mucous membrane, extending from the pylorus to the rectum.†

About thirty-seven cases of measles were admitted into the Hammond hospital in March. At the date of my visit four of them had died of pulmonary complications and several others were then suffering from like causes. These patients were in a poor ward,—the poorest in the hospital. It was cool, damp and not very comfortable; and to this I was inclined to attribute, in part at least, the proneness of the disease to these accidents. Exposures to

* It is needless at this date to do more than refer to the views of SALISBURY, who attributed the disease to a fungus on the bed straw used by the troops. See *American Jour. Med. Sciences*, Vol. XLIV, N. S., 1862, pp. 17–23 and pp. 387–394.

† Surgeon J. B. BELLANGER, U. S. Vols., in charge of this hospital, has reported these occurrences—*Amer. Med. Times*, VIII, N. Y., 1864, pp. 258–9. The thermometer fell suddenly from 60° to 18° Fahr., with a cold northwest wind. The bad effects of the low temperature were soon manifested by the occurrence of a dry husky voice and distressing cough in the rubeolous patients, soon followed by diarrhœa, attended in a few days with bloody discharges, very frequent in some cases and quickly fatal. Dr. BELLANGER puts the number of cases at thirty-nine, of which eight died,—six of enteritis, one of acute bronchitis and one of sudden pulmonary congestion.

dampness, to a low and fluctuating temperature and to vitiated air during the progress of the disease are. I am convinced, fruitful causes of serious and often fatal visceral congestions and inflammations.

Surgeon W. M. GATES, *22d Mo., Dec.* 31, 1861.—The regiment is principally composed of men who have been engaged in agricultural pursuits, owning their own farms and living in their own houses in reasonable comfort. They have been accustomed to a life of labor without undergoing any great hardships or privations, their food plain and frugal and their habits correct. A smaller proportion of the men of the regiment, enlisted in towns and villages, principally foreigners, have lived more irregular lives and their habits are much less correct. The latter have suffered somewhat from diseases to which such subjects are always liable, which diseases, however, have been either lessened or prevented by proper discipline. The location of the camp in Macon City was well selected from the sanitary point of view, being upon an elevated plateau which afforded drainage; but as the tents were of the smallest size and without flies they were inconvenient and often crowded. Under these circumstances it was difficult to enforce that desirable degree of neatness and cleanliness favorable to perfect health. The troops remained in camp until the cold season was far advanced, and suffered much in consequence of some severe storms which occurred previous to their removal to winter quarters. The evil effects of their exposure were heightened by the fact that their clothing was not supplied in proper time and when furnished was found to be of poor quality. They suffered especially from the want of overcoats, which were not provided until sometime after the winter had set in. Their coats were of too light a fabric to afford sufficient warmth and protection and were destitute of capes. They have never yet been fully furnished with boots, although greatly needed. In consequence of these causes, the influence of which has been much increased by the severe duties in which they have been engaged, and which consisted in almost incessant scouting over a wide extent of country in northern Missouri, a large proportion of the men have suffered from those forms of disease which result from exposure to cold and atmospheric changes, as catarrh, bronchitis, pleurisy, pneumonia, etc.; from the continuance of their causes these diseases were difficult to treat successfully, and relapses were of frequent occurrence. While the health of the regiment was in this unfavorable condition, measles made its appearance on October 16, communicated by the 23d Missouri regiment, which, returning from St. Louis, remained some days at this station. Notwithstanding all efforts to isolate the earliest cases the disease soon became general, seizing upon every one not protected by a former attack. The number of these was large, as the regiment was recruited from a scattered rural population. The disease presented no difficulty in its treatment when uncomplicated, but from the causes mentioned, many cases were complicated with bronchitis and catarrhal pneumonia. Hence the large number of deaths reported as due to pneumonia. As a number of our patients were suffering from catarrh and bronchitis on the accession of measles, and, as might be feared under the circumstances, pneumonia would soon supervene, our troops went immediately into winter quarters. These consisted of unoccupied houses in the town, generally in imperfect repair, many of the windows being broken, doors gone, plastering knocked down from the walls and the buildings otherwise injured. They were for the most part destitute of fire-places, and the troops without stoves, which, up to this date, have been but partly supplied. The quarters, owing to these circumstances, were uncomfortable and unfavorable to the health of the men,—so much so that it has been found dangerous to return convalescents to quarters for fear of relapse. By the labors of the men and efforts of the officers the quarters are now in much better condition, and we have reason to hope that in a short time they will be further improved.

Ass't Surgeon S. COMPTON SMITH, *4th Wis. Cav., Relay House, Md., Sept.* 30, 1861.—At Racine rubeola made its appearance among the troops, and when, on July 2, the regiment was mustered into the service of the United States, there were two hundred cases of that disease. Racine is situated on the west bank of Lake Michigan, where, until the time we left for the South, cold easterly winds prevailed which greatly aggravated the sequelæ of rubeola, particularly congestion of the lungs. The disease continued to spread through the regiment to such an extent that during our transportation to Harrisburg I had two and part of the time three passenger cars filled with rubeolous patients, and was obliged to leave about twenty at Elmira, N. Y.

Ass't Surgeon WALTER B. MORRISON, *3d Mich., Edward's Ferry, Md., Oct.* 25, 1862.—Rubeola made its appearance in the command, previous to mustering into the United States service, while at the recruiting rendezvous, Grand Rapids, Mich. The disease spread rapidly, seizing upon all who had formerly escaped the malady, and indeed, a few suffered a second attack. The acme of the epidemic was reached in about twenty days, after which its decline was rapid, the disease having become nearly extinct when the command was ordered to Washington two weeks subsequently. Occasional cases were developed, however, during the succeeding two months. Four deaths occurred in one hundred and thirty-four cases. Secondary pulmonary affections were of frequent occurrence, owing to exposure during cold and damp weather. Many men were permanently disabled and discharged from the service.

Act. Ass't Surgeon A. B. SHALER, *Newport Barracks, Ky., April* 3, 1862.—There were thirty-four cases of measles. Many of these were treated in Sibley tents with board floors and a stove, without a single complication; others were cared for in a new temporary hospital consisting of two airy rooms. Every case in the hospital was more or less complicated, and the only death from congestion occurred in this building. This was in part due to deficient ventilation at night and in part to want of proper water-closets. Convalescents were exposed in going from the wards to the sinks in rear of the hospital building.

Surgeon H. W. KENDALL, *50th Ill., Dec.* 31, 1861.—Rubeola occurred late in November while the regiment was quartered in tents on an elevated and bleak prairie near Chillicothe, Mo., and was followed in a majority of the cases by pneumonia and frequently relapsing catarrhs. The removal to St. Joseph, a distance of eighty miles, in open cars, while most of the cases were only yet convalescing, produced another list of pneumonic sequelæ.

Surgeon L. H. ANGELL, *52d Ill., Dec.* 31, 1861.—About December 1, while in camp at Benton Barracks, measles began to make its appearance. The exposure of the men for [illegible] quarters in a rainy

camp left but few of the regiments unaffected with bronchitis or some form of inflammation of the air passages. The quarters of the men were poorly or not at all ventilated, and were warmed by stoves burning soft coal (after stoves were procured), which permitted a large amount of gas to escape into the atmosphere, so vitiating it as to act most perniciously upon the mucous membrane of the air passages. * * * Each orderly sergeant was furnished with a bottle of expectorant medicine which was administered to the men in quarters. At St. Joseph, Mo., after December 11, many cases of rubeola were accompanied or followed by pneumonia, which is probably attributable to the exposure of the men at the time and previous to the attack. Cases of pneumonia are occurring from exposure while guarding railroads and bridges, and I have to excuse from duty a large number of convalescents, especially from measles, who would be sure to return in a few days with renewed attacks were they ordered to active service.

Surgeon WILLIAM H. PALMER, *3d N. Y. Cav., Poolesville, Md., Dec.* 31, 1861.—Many cases of rubeola occurred during the present winter, and the disease is still on the increase. The type is mild. The precursory symptoms are attended with little febrile action; but the pulmonary affection consecutive to the eruption has been quite severe, and in many cases associated with great and persistent dyspnœa and complete aphonia. Notwithstanding these complications, recovery has been in every case of that degree which forbids application for discharge. Some of those attacked affirm that they have had the disease before, but their assertions require confirmation.

Surgeon J. K. BIGELOW, *8th Ind., Indianola, Texas, Feb.* 20, 1864.—Rubeola, which occurred as an epidemic during the autumn and winter of 1861, was unusually complicated with pulmonary lesions which frequently ended fatally or incapacitated the soldier for further service.

Medical Inspector E. P. VOLLUM, *U. S. A., Washington, D. C., Dec.* 1, 1862.—There broke out among the 1st U. S. Sharpshooters, while at the camp of instruction near this city, a form of measles which directly or by a subsequent congestion of the lungs, caused a large number of deaths. Many, supposed to have recovered from the disease, are still suffering from pulmonary affections and persistently applying for their discharge. In January of this year the 1st Mich., while stationed at Annapolis Junction, became subject to an epidemic of measles which prevailed during that and the following month; but the disease required little attention except when complicated with pulmonary affections, which, as usual, were more formidable than the disease itself. One hundred and ninety-two cases were reported, only one of which was fatal. At Fortress Monroe, during March and April, while this regiment was in tents, pneumonia and bronchitis prevailed to some extent as the sequelæ of measles, and seemed to be induced by the change from an inland to a marine climate.

Of the recruits for the 13th N. Y., received about the beginning of January, twenty-eight were taken down with measles soon after they joined. Four died of pneumonia and two others succumbed to the disease in general hospital. * * * Many cases of measles in the 2d Me. were complicated with congestion of the lungs, five proving fatal. During the winter nine deaths occurred in the regimental hospital, all of which were directly or indirectly attributable to measles.

Surgeon L. M. SLOANAKER, *19th Iowa, Brownsville, Texas, April* 20, 1864.—An outbreak of measles occurred in September, 1862, and prevailed until the beginning of December. About thirty men contracted the disease. Usually it was of a mild form and when uncomplicated required but little treatment. Some of the cases transferred to general hospital proved fatal; two of those retained in the regimental hospital died from pulmonary complications.

Surgeon J. M. MERRON, *2d N. H., Portsmouth, N. H., June*, 1861.—There were about fifty cases of measles, many of them complicated with pneumonia; yet a rapid recovery was the rule; no case terminated fatally. Treatment consisted chiefly of mild febrifuges and diaphoretics, with a mixture composed of antimonial wine, syrup of squill, sweet spirit of nitre and paregoric.

Surgeon HENRY MANFRED, *22d Ky., Baton Rouge, La., March* 29, 1864.—In December, 1861, while at Camp Swigert, Greenupburg, Ky., the entire regiment was attacked with rubeola, two or three hundred men being sick at one time. The winter was very wet and cold and many chronic affections of the lungs were engendered by this epidemic.

Act. Ass't Surg. B. R. PALMER, *Sauk Centre, Minn., Jan.* 2, 1863.—Rubeola, which took its course through the camp, was introduced by Wisconsin troops. Severe pulmonary irritation, pneumonia, diarrhœa and dysentery accompanied or followed the disease.

Surgeon A. J. MCKELWAY, *8th N. J., Camp Van Lear, near Alexandria, Va., Oct.* 20, 1862.—Toward the end of February and through the month of March rubeola to the extent of about thirty cases prevailed in the regiment. Although the disease was of a severe type no case proved fatal; but in several cases tubercular and bronchitic developments necessitated the discharge of the men.

Ass't Surgeon J. W. MASON, *12th Corps d'Afrique, Port Hudson, La., Feb.* 23, 1864.—In September, 1863, the camp was visited with measles, mild in itself, but followed by acute bronchitis and pneumonia, which either proved fatal or left the system in an adynamic condition.

Surgeon JOTHAM DONNELL, *15th Me., Carollo Pass, Texas, Feb.* 9, 1864.—Measles and catarrhs were very prevalent at Augusta, and quite severe both in the regimental camp and the surrounding country. A few cases resulted in severe bronchitis and pneumonia. No great mortality occurred at that time, three men only having died during the winter. * * * The numerous cases of phthisis pulmonalis during the first season at the South may, I think, be attributed in part to the measles and the exposures of the men at Augusta.

Surgeon MADISON REESE, *118th Ill., Port Hudson, La., Feb.* 21, 1864.—Two-thirds of all the pulmonary diseases were caused by measles.

Surgeon WILLIAM BERRY, *7th Ky., Baton Rouge, La., April* 27, 1864.—During the latter part of September and all of October, 1861, measles prevailed as an epidemic. Nearly four hundred cases occurred. Much of the subsequent

disease from which the regiment suffered is attributable to this epidemic. Its sequelæ affected the men in two ways: Some suffered from bronchial irritation or bronchitis; others from irritability of the bowels. In subsequent epidemics of typhoid fever and pneumonia, those patients who had measles during the period mentioned were more dangerously affected than their more fortunate comrades.

Surgeon H. F. VANDERVEER, *5th N. J., Alexandria, Va., Oct.* 21, 1862.—An epidemic of measles appeared about the end of February and subsided in May. Twenty-three cases occurred in the regiment and one death resulted in division hospital. The disease was severe, the eruption often becoming livid and receding on the second or third day, which was sure to be followed by dangerous pulmonary congestion. This change was often exceedingly sudden; two hours sometimes changing the symptoms of rubeola to those of typhoid pneumonia. Emetics and stimulants were the means of cure employed in this condition. Tubercular disease appeared in several instances as a sequel.

Surgeon A. W. MCCLURE, *4th Iowa, Springfield, Mo., April* 2, 1862.—About December 20 measles broke out in camp. A large number of men were attacked. Consecutive pulmonary troubles disappeared only when the weather became warm, so as to permit the patients to get into the open air. All the fatal cases of pneumonia except two resulted from measles.

Surgeon C. G. PEASE, *2d Wis. Cav., Cassville, Mo., July* 1, 1862.—While at Milwaukee we had a large number of cases of rubeola. To an enfeebled condition of the lungs, consequent on this disease, I attribute the frequency of diseases of the respiratory organs that has since occurred; nearly all the cases of tubercular disease observed in the regiment since the first of March appear to have originated in the previous attack of measles.

Surgeon FRANKLIN B. HOUGH, *97th N. Y., Mercersville, Mo., Oct.* 5, 1862.—While recruiting in winter quarters at Booneville, N. Y., during the winter of 1861–62, rubeola prevailed as an epidemic, attacking some fifty or sixty men, of whom thirteen died. Many who recovered traced lasting pulmonary difficulties to this disease.

The CLINICAL RECORDS of measles show a return to duty three or four weeks after the onset; but in many cases the stay in hospital was prolonged for as many months by the continuance of bronchial inflammation or the supervention of broncho-pneumonia or diarrhœa. In some cases the specific agency manifested its virulence by a dark-purple color of the eruption and symptoms of internal congestion. Generally, however, the point of interest in the record is the consecutive disease rather than the progress of the eruptive fever. Sometimes pneumonic congestion was suddenly developed by exposure while the skin was affected, but more frequently pulmonary disorders, including consumption, appeared to be engrafted on the patient during convalescence. Laryngitis in some cases caused sudden death and in others a temporary or even permanent aphonia. Cerebral meningitis sometimes occurred, and intercurrent or sequent attacks of erysipelas were common. Conjunctivitis was a frequent sequel, and deafness followed the invasion of the middle ear by way of the Eustachian tube; occasionally the ear became involved in the suppuration of the glands in its neighborhood. Œdema of the feet, orchitis and abscess of the ischio-rectal space, inducing fistula in ano, appeared among the sequelæ.

CASE 1.—Private James W. Simmons, Co. E, 50th Ill.; age 22; was admitted Feb. 28, 1863, from his regiment near the city, with high fever, the eruption of measles, sore throat and hoarseness. Gave Dover's powder and prescribed rest in bed and low diet. He improved speedily, but some cough persisted until March 10. He was returned to duty on the 22d.—*Hospital, Quincy, Ill.*

CASE 2.—Private Nathan B. Moore, Co. H, 137th Ill.; age 18; was admitted June 9, 1864, from regimental camp in this city with the eruption of measles, some febrile excitement and cough, pain in the bowels, constipation and coated tongue. He improved under treatment by sweet spirit of nitre and syrup of ipecacuanha, with rest in bed and low diet. He was returned to duty on the 28th.—*Hospital, Quincy, Ill.*

CASE 3.—Private Charles H. Moulton, Co. D, 22d Mass.; age 27; was admitted from guard duty Jan. 22, 1863, with measles. He had slight fever; his face and the upper part of his body were covered with the eruption, which was also discovered on the roof of his mouth; there existed also slight bronchitis and conjunctivitis. Flaxseed tea was prescribed in large quantities, with a tablespoonful of Mindererus' spirit every three hours; the diet was restricted to milk and farina. On the 25th his bronchitis was aggravated; two days later he was much better in every respect, squill, wild cherry and morphia having been substituted for the acetate of ammonia. Chicken was allowed. By February 6 he had only a slightly inflamed condition of the bronchial and conjunctival membranes. On the 18th he resumed his duties as a member of the hospital guard.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 4.—Private Lewis Walters, Co. B, 39th Mo.: age 28: was admitted Dec. 17, 1864, with alternate shiverings and heat, anxiety, lassitude, pain and weight across the forehead and eyes; skin hot and studded with the characteristic eruption of measles; appet te poor. Gave cantharides and stimulants. Jan. 2, 1865: Still weak; coughing severely. February 20: Improving slowly. March 20: Still weak and with severe cough. April 1: Discharged.—*Hospital No. 23, Nashville, Tenn.*

CASE 5.—Private Frank P. Heman, Co. C, 16th U. S. Inf.; age 21; was attacked with measles Jan. 16, 1863, and transferred to Fort Ontario, where he remained suffering from fever till late in February, when he was returned to duty with his regiment, then serving in the Army of the Cumberland. In a short time he was again seized with fever, and after staying about a month in hospital at Murfreesboro', Tenn., he was transferred to this hospital May 22. When admitted he was scarcely able to walk; tongue coated; pulse 124; pain in chest; cough; slight expectoration; appetite impaired; urine scanty and high-colored. Gave tepid bath; Dover's powder at bed time; also sweet spirit of nitre, syrup of squill and Norwood's tincture of veratrum viride, with counter-irritation to the chest. 29th: Cough; slight expectoration; but little pain; pulse 75; unable to walk. Gave paregoric, syrup of squill and fluid extract of senega. June 3: Pain in the bowels for several days, relieved by paregoric. Improving; able to walk. 8th: Stools frequent and watery. Gave nitrate of silver and opium. 14th: Severe chill at night followed by fever, great thirst and pain in the bones. Gave quinine and Dover's powder. He was transferred next day to No. 1 hospital, Louisville, Ky., whence he was returned to duty June 26.—*Hospital No. 23, Nashville, Tenn.*

CASE 6.—Corporal Aaron Munsell, 26th Mich.; age 29: enlisted Feb. 20, 1864. He contracted measles on April 13, and was admitted on the 26th to Third Division hospital, Alexandria, Va., where he became convalescent. On May 6 he was transferred to this hospital. Gave compound tincture of cinchona and full diet. Returned to duty March 21, 1865.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 7.—Private John Edens, Co. A, 13th West Va.; age 19: was admitted March 16, 1865, with diarrhœa. He was convalescing slowly when, on April 27, the eruption of measles, dark purple in color, appeared on his face. He complained of great oppression about the chest, and had subsequently nausea, persistent vomiting and profuse diarrhœa. He died May 8.—*Cumberland Hospital, Md.*

CASE 8.—Private Alfred Lord, Co. G, 20th Ind.; age 22: was admitted Feb. 8, 1865, with chronic diarrhœa. On March 15 he had a severe chill, which was followed on the 17th and 18th by the eruption of measles over the entire surface. On the 19th the patient sat at an open window, and in the evening the eruption had almost disappeared, while a dull pain in the right side of the chest, aphonia, fever and pain in the head were developed. Gave diaphoretics and applied cups. Next day the pain in the chest was increased and there was dulness on percussion over the lower lobe of the right lung; pulse 100. Repeated cups and applied sinapisms; gave expectorants, stimulants and beef-essence. The pneumonic complication assumed a typhoid character, and on the 24th erysipelas attacked the face. He died two days later, retaining consciousness to the last.—*Mower Hospital, Philadelphia, Pa.*

CASE 9.—Private G. P. Foster, Co. B, 26th Mich.; age 19; suffered with measles while in camp. Pneumonia supervened, and the patient was admitted March 12, 1863: Skin hot and dry; delirium at times; breathing hurried and oppressed; cough with viscid, rusty sputa; bronchial respiration and slight dulness over the lower lobes of the lungs. He sank gradually, dying on the 16th.—*Third Division Hospital, Alexandria, Va.*

CASE 10.—Private C. L. Brocket, Co. G, 30th Ill.; age 19: was admitted Feb. 23, 1864, in a condition of typhoid delirium due to pneumonia, which had supervened on an attack of measles. He was treated with opium enemata, beef-tea, brandy and cordials; but he grew worse and died March 4.—*Hospital, Quincy, Ill.*

CASE 11.—Private Matthew Dyson, Co. G, 72d Ill., had measles in September, 1862, but did no duty after his convalescence, as he continued affected with cough and occasional diarrhœa. When admitted, April 17, 1863, he was greatly debilitated and had bronchial breathing on both sides. A chill on the 25th was followed by violent pain in the right and afterwards in the left side: the respiration became hurried and the diarrhœa aggravated. He died May 3.—*Lawson Hospital, St. Louis, Mo.*

CASE 12.—Private William A. West, Co. G, 7th Vt.; age 18: enlisted Jan. 23, 1865, and had measles in February, followed by pain in the chest. After treatment at New Orleans, La., he was admitted to this hospital June 17, with diarrhœa and dull pain in the region of the liver; skin hot; pulse full but not strong; respiration on right side diminished, on left side increased. Gave cod-liver oil, syrup of wild cherry and extra diet, with neutral mixture as required. On the 20th a sharp pain with well-marked friction sounds and dulness was developed on the right side. Beef-essence and wine-whey were given and mush poultices applied to the chest. 28th: Removed poultices. He improved by July 1, but there was still much effusion in the chest. He was discharged on the 20th because of chronic diarrhœa and pleuro-pneumonia.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 13.—Private Alvin C. Evitt, Co. I, 99th Ill.; age 22: was admitted Sept. 23, 1863, with diarrhœa and pneumonia following measles. He had severe cough with pain in both sides, headache with nausea in the morning; severe umbilical pain when at stool,—about twelve passages daily. Gave turpentine emulsion and milk diet. He improved slowly. By December 5 the diarrhœa was reduced to five or six passages daily and by Jan. 10, 1864, to three or four. He was returned to duty March 9.—*Hospital, Quincy, Ill.*

CASE 14.—Private William Tibby, 18th Pa. Cav., was admitted March 9, 1864, with measles and bronchitis. Gave an expectorant mixture during the day, Dover's powder at night; nutritious diet. On the 25th the eruption was almost gone and the bronchitis nearly cured; but dysentery had supervened: Tormina; tenesmus; stools frequent, bloody and slimy; pulse full and bounding; tongue red, dry and thickened. Gave emulsion of turpentine three times a day and an opiate enema at night; milk and farinaceous diet; rest in bed. On the 29th the cough had ceased and the dysentery was relieved; a cutaneous eruption of doubtful character had appeared. The patient was returned to duty April 4.—*Second Division Hospital, Fifth Army Corps.*

CASE 15.—Private Hiram Steanbrook, Co. D, 97th Ill., was attacked at Memphis, Tenn., Dec. 19, 1862, with measles, which left him with a bad cough and so weak that he was unable to walk. When admitted, March 21, 1863, he was emaciated and had slight diarrhœa; pain in left side; tenderness; edges and tip of tongue red, dorsum coated;

pulse weak and rather frequent. On the 26th he was taken with erysipelas of the face. Iron, quinine and brandy were prescribed. By April 1 his condition was much improved. On the 10th the abdomen was observed to be discolored by a subcutaneous extravasation of blood. Lemonade was given. This symptom disappeared by the 16th. The patient was returned to duty April 29.—*Lawson Hospital, St. Louis, Mo.*

Case 16.—Private Joseph W. Conrad, Co. K, 1st N. Y. Eng'rs; age 17; enlisted April 4, 1864, and was taken with measles on the 29th. He was admitted, May 6, from Harewood hospital, Washington, D. C., with bronchitis. On the 15th the tongue and submaxillary glands became inflamed; pleurisy was developed on the 19th, with a large effusion on the 27th. On June 11 the patient's symptoms became aggravated on account of the floor of the ward having been scrubbed. On July 18 he was evidently failing; the effusion was being absorbed gradually, but gurgling was heard in the apex of the left lung posteriorly and respiration in the subclavicular region was harsh and prolonged. On August 3 the symptoms of phthisis were considered unequivocal. Death took place on the 16th.—*Satterlee Hospital, Philadelphia, Pa.*

Case 17.—Private George Damon, Co. C, 14th Vt.; age 24; was taken sick Feb. 20. 1862, with jaundice. While convalescing he was admitted, March 6, with headache and a dry cough with bronchial râles. Next day the eruption of measles was apparent over the whole surface; pulse 100; thirst; cough dry; throat sore; bowels confined; urine high-colored. His case progressed favorably until the 14th, when the velum palati and arches became swollen and red and the voice whispering. Later in the day laryngotomy was performed and artificial respiration kept up for some time without success.—*Surgeon E. H. Sprague, 14th Vt., Brattleboro', Vt.*

Case 18.—Private George A. Boyce, Co. B, 11th Vt., had a severe attack of measles Jan. 1, 1864, at Washington, a few weeks after his enlistment. He lost his voice and became much debilitated. While under treatment at Harewood hospital he was taken, June 4, with dysentery. On his arrival in Vermont via David's Island, New York Harbor, he was in a very low state. Treatment has relieved his diarrhœa and improved his general condition, but his voice has not been restored. He was transferred to the Invalid Corps Aug. 21, 1864.—*Hospital, Burlington, Vt.*

Case 19.—C. H. Flury, 8th Mich. Bat'y, was admitted March 27, 1863, with aphonia, cough, pain in the chest and diarrhœa following an attack of measles in September, 1862. He was treated with alteratives, turpentine emulsion and milk diet. He recovered his voice and was sent to his regiment Aug. 20, 1863.—*Hospital, Quincy, Ill.*

Case 20.—Private Milton H. Beecher, Co. M, 15th N. Y. Cav.; age 20; was admitted May 23, 1864, from field hospital. He had been attacked with measles, April 5, at Burlington, Vt., and had been treated in hospital at Springfield, Winchester and Martinsburg. At the last-mentioned place he had a relapse and was sent to this hospital. He became delirious while *en route*. On arrival he was wild and unmanageable. He was sponged at once and given a Dover's powder. Next day his appearance was wild; pulse rapid and thready; tongue moist and natural; face flushed; slight dry cough. A cathartic was given; also an antimonial cough mixture; evaporating lotions were applied to the head and blisters behind the ears. On the 25th the delirium continued. The patient's head was shaved and douched with cold water. On the 26th there was much jactitation with subsultus and dysuria. Sweet spirit of nitre was given three times. On the 27th there were clonic spasms and rigidity of the muscles of the arms, muttering delirium and partial coma; pulse 120 and wiry, with occasional remissions. Fluid extract of veratrum viride was given in three-drop doses every three hours and the ice-water to the head was continued. Next day the pulse fell to 75, with increase of volume and softness. After this the coma deepened and the pupils dilated. Iodide of potassium was given with wine and beef-tea. He died June 1.—*Hospital, Cumberland, Md.*

Case 21.—Private James M. John, Co. I, 8th Pa. Reserves; age 19; was admitted July 6, 1864, on account of inflammation of the eyes, with purulent discharge and photophobia following measles. Gave full diet; applied a lotion of borax. He improved; was furloughed August 26 and returned to duty September 6.—*Satterlee Hospital, Philadelphia, Pa.*

Case 22.—Private William Martin, Co. B, 33d Wis.; age 20; was admitted Aug. 26, 1863, with slight congestion of the conjunctiva and photophobia, the result, according to the patient's statement, of an attack of measles in January. Gave cinchona and iron at each meal; full diet. September 3: Photophobia distressing; appetite good; bowels regular. Applied laudanum diluted, but as this proved too irritating, an infusion of tea was prescribed. 7th: No better. Gave small doses of extract of conium, sulphate of cinchonia and citrate of iron at each meal; the eyes to be kept shaded. October 1: Improving. November 16: Returned to duty.—*Hospital, Quincy, Ill.*

Case 23.—Private George Tinker, Co. K, 2d Wis.; age 23; was admitted Sep. 25, 1861, with lumbago following an attack of measles and intermittent fever. He had pain in the loins, aggravated by motion, and a slight swelling over the seat of pain; conjunctivæ inflamed; pulse 72; tongue natural. He was treated by a blister to the loins, Dover's powder, quinine and an eye-wash containing sulphate of zinc. He was transferred, October 1, to Annapolis, Md., whence he was returned to duty December 2.—*Seminary Hospital, Georgetown, D. C.*

Case 24.—Private George W. Gill, Co. F, 4th N. Y. Art'y; age 21; enlisted Dec. 14, 1863, and contracted measles while with his regiment at Fort Ethan Allen, Va. He was treated in regimental hospital, in the Carver hospital, Washington, and the Mower hospital, Philadelphia, before his admission to this hospital May 13, 1864. He had catarrhal ophthalmia, granulations, purulent discharge and photophobia. Applied sulphate of copper daily; full diet. July 20: Lids much inflamed and closed; profuse purulent discharge. Applied cold compresses soaked in a solution of borax and atropia. 31st: Discharge abated; inflammation subsided. August 5: Furloughed. 21st: Returned. December 20: Slight fever. 31st: Much better. Jan. 1, 1865: Pneumonia. February 1: Improving rapidly. Gave iron and quinine three times a day and applied locally a solution of borax. March 25: Furloughed.

April 13: Returned; eyes somewhat inflamed; still feeble. Continued former treatment. May 19: Discharged.—*Satterlee Hospital, Philadelphia, Pa.*

Case 25.—Private Alvin P. Barnaby, Co. M, 1st Mich. Cav.; age 43; was admitted Aug. 18, 1864, from Harrisburg, Pa., with conjunctivitis consequent on an attack of measles. The membrane was loose and swollen, and small yellowish-red vesicles appeared at the margin of the cornea; there was also a frequently recurring ocular hyperæmia, with retinal irritation and asthenopia; his general health was fair. Blisters were applied over the mastoid process and saline purgatives occasionally given; pediluvia were also used; a green shade was put over his eyes; a lotion of corrosive sublimate, three grains, laudanum two drachms and distilled water four ounces was applied lukewarm on rags for a half hour three times daily; full diet was given. He improved steadily. The treatment was afterwards changed for an eye-water of borax six grains, cherry-laurel water fifteen drops, decoction of quince seeds a drachm and distilled rose-water three and a half ounces. Jan. 26, 1865: Furloughed. February 25: Returned. He had frequent relapses till March 23, after which he improved. May 20: Discharged.—*Satterlee Hospital, Philadelphia, Pa.*

Case 26.—Private James A. Munck, Co. G, 100th Pa.; age 18; enlisted Feb. 25, 1864. He contracted measles and was admitted, March 27, to Division No. 1 hospital, whence he was transferred to Mower hospital, Philadelphia, and on May 13 to this hospital. Diagnosis: Deafness of the right ear. Warm water was used by syringe and a few drops of a weak solution of sulphate of zinc were instilled daily into the ear. Improvement followed and the patient was returned to duty August 6.—*Satterlee Hospital, Philadelphia, Pa.*

Case 27.—Sergeant Robert Myers, Co. I, 1st East Tenn. Cav.; age 21; was admitted May 25, 1863, having been treated in various hospitals for measles and its sequelæ since Dec. 5, 1862. On admission he was much prostrated, and had pain in the chest, fever, nausea and irregular abdominal pains. Gave calomel, quinine and Dover's powder every three hours, with sinapisms to the abdomen. 26th: No fever; stools frequent and copious; epigastric pain. Gave powders of subnitrate of bismuth, persulphate of iron and opium. 30th: Fever; pulse full; tongue white; pain in right hypochondrium. Gave powders of quinine, Dover's powder and ipecacuanha every three hours, with ten grains of blue mass and five grains of Dover's powder at bedtime. 31st: Very weak; fever; twenty stools. Continued powders and gave pills of nitrate of silver and opium. June 3: Caught cold from kicking away the bedclothes during the night; lymphatic glands of face much enlarged; severe cough with thin glairy sputa. Continued medicine; applied hot fomentations to face; expectorants. 9th: Rested badly; delirious; pain in the face from enlarged glands; diarrhœa persisting. 10th: Purulent discharge from ear; stupor. 8 P. M: Unconscious; extremities cold; profuse suppuration from both ears; involuntary stools; died at 8.30 P. M.—*Hospital No. 23, Nashville, Tenn.*

Case 28.—Private William H. Shultz, Co. B, 30th Ill.; age 24; was admitted March 18, 1865, from David's Island, New York Harbor, with œdema of the feet, following an attack of measles in December, 1864. Both feet were swollen and pitted on pressure. He was treated with cream of tartar, squill and iodine, but without success. He was discharged from service May 9.—*Hospital, Quincy, Ill.*

Case 29.—Private Rector Cornwall, Co. K, 130th Ill.; was admitted April 13, 1863, with orchitis, resulting from exposure to cold while convalescing from measles. His left testicle was very painful and enlarged to three or four times the natural size. Treatment consisted of strapping and small doses of mercury and chalk. Improvement followed and the patient was returned to duty July 20.—*Lawson Hospital, St. Louis, Mo.*

Case 30.—Sergeant William Litter, Co. K, 4th Va. Cav.; age 26; was admitted May 4, 1863, with broncho-pneumonia and diarrhœa after measles. He was treated with blisters and mercurial alteratives. A large abscess on each side of the anus developed into fistula. He was discharged from service June 27.—*City Hospital, St. Louis, Mo.*

Post-mortem Records.—The frequency of the pulmonary affection in fatal cases of measles may be appreciated from the many instances submitted among the *post-mortem* records of pneumonia.* In addition to these there are but seven recorded cases: In case 1 the blood was black and uncoagulated; in 2 and 3 there was cerebral congestion; in 4 pleurisy; in 5 pericarditis; in 6 sudden death, probably from heart failure, and in 7 an extensive consecutive inflammation of the knee-joint and femur.

Case 1.—William D. Emberg, prisoner of war, was admitted May 23, 1864, with measles. Desquamation was in progress, and, as the patient was debilitated, tonics were prescribed. On May 26 he had chills followed by fever, with frequent feeble pulse, constipation and severe pain in the head, back and limbs. A low form of delirium supervened, and he died June 4. The attending physician supposed the case to be one of typhus. *Post-mortem* examination: The blood was black and fluid and the tissues flabby, but no actual lesion was anywhere observed.—*Third Division Hospital, Alexandria, Va.*

Case 2.—Private S. Hammock, Co. H, 13th Ky.; admitted Feb. 28, 1865. Diagnosis—Rubeola. Died March 16. *Post-mortem* examination: There was serum effused between the membranes and the brain. The gall-bladder was collapsed; the spleen enlarged; the bowels congested.—*Act. Ass't Surgeon J. E. Brooke, Hospital, Rock Island, Ill.*

Case 3.—Private Abel W. Taylor, Co. B, 32d Me.; age 16; was admitted April 22, 1864. He had been sick for about three weeks, having suffered during a part of that time from an attack of mumps. On admission there was no parotid swelling, but the face was dusky-red, the body covered with the eruption of measles; the pulse was rapid, 130; the breathing hurried, 30; and there was frequent expectoration of rust-colored mucus, with dry râles over the

* See *infra*, page 783.

chest anteriorly and subcrepitant râles posteriorly but no marked dulness; low delirium was present. He died on the 24th. *Post-mortem* examination: There was venous congestion and fine arterial injection of the pia mater, with interstitial congestion of the brain and some effusion of bloody serum in the ventricles and subarachnoid space. The lower lobe of the right lung was hepatized, the pleura of the affected part covered with masses of lymph and the pleural cavity filled with liquid. The heart was healthy and contained small red and white clots in its ventricles. The liver was somewhat granular; the spleen a little softened; the other organs healthy.—*Cuyler Hospital, Philadelphia, Pa.*

Case 4.—Private Thomas Thompson, Co. H, 20th Me.; age 20; was admitted April 9, 1864, presenting the general appearance of one affected with tubercular disease of the lungs. On the 22d the eruption of measles appeared. Before it faded the patient was attacked with pleurisy, and died May 1. *Post-mortem* examination: The apex of the right lung contained tubercle in the inflammatory stage; the right pleura was thickened, adherent in places and covered with lymph; the sac contained a large effusion. The liver was fatty.—*Third Division Hospital, Alexandria, Va.*

Case 5.—Private Jefferson Marsh, recruit, 28th Mass.; age 24; was admitted May 8, 1864, with measles. On the 15th pneumonia of the left side was developed, and five days later the physical signs of pericarditis were observed. On June 1 the tonsils, base of the tongue and epiglottis were found to be extensively ulcerated. He died on the 3d. *Post-mortem* examination: The blood was liquid. The trachea was much inflamed and denuded of mucous membrane. The lower part of the left lung was consolidated. The pericardium was nearly filled with serum. The abdominal viscera were healthy.—*Third Division Hospital, Alexandria, Va.*

Case 6.—Private James R. Walker, Co. A, 3d West Va.; age 20; was admitted April 30, 1865, convalescing from measles. He was weak and had a slight cough with mucous expectoration; but his appetite was good and his tongue moist. He improved and was feeling quite well when, on May 11, while sitting on his bed and talking he suddenly put his hand to his heart, fell over on the bed and died without convulsions or apparent pain. *Post-mortem* examination: Body but little emaciated. The upper lobe of the right lung was studded with tubercle and its apex contained a small cavity. The walls of the left ventricle of the heart were hypertrophied and softened.—*Cumberland Hospital, Md.*

Case 7.—Private Chester Morse, Co. E, 2d Colo. Cav., was admitted Jan. 30, 1864, with measles. As convalescence progressed the left knee and thigh became affected with pain of a rheumatic character, and in time a true synovitis of the knee and periostitis of the femur were developed. Large opiate doses were required to alleviate his suffering. By March 31 the thigh and knee were much swollen and the intermuscular spaces distended with sero-purulent matter, which had established an external communication for its discharge. Hectic supervened, and death occurred May 1. *Post-mortem* examination: Bony spicula were found in the diseased periosteum; the outer condyle, and the shaft of the femur at the junction of its middle and lower third, were honey-combed; the cavity of the knee-joint was filled with sero-purulent matter; the outer part of the head of the femur, the great trochanter and the digital fossa were involved in the disease.—*Hospital, Kansas City, Mo.*

Treatment.—According to the medical records of the war the treatment of camp measles, whether in the individual or in the command, appears to have involved measures of sanitary supervision rather than clinical instructions or pharmaceutical formulæ. An epidemic of measles in a susceptible command subject to the exposures of active service was often as disastrous in its consequences as a severe engagement with the enemy. Men and regiments of men insusceptible to the poison of this disease are by so much the more efficient as a military machine. Recruits from the city are more likely to have passed through the disease in childhood than those from the rural districts,—city regiments are therefore to be preferred in this connection. But when the call to service is urgent this becomes a secondary matter; the liability to disease under exposure to its causes must be accepted as a part of the danger to be faced. Measles will thus continue to be a subject of interest and anxiety to army medical men until the discovery of a means of protection against it independent of subjection to its influence in previous epidemics.

The mildness of the disease when running its course under favorable conditions, as compared with its virulence in crowded quarters and hospitals, and the disability and death resulting from its complications and sequelæ in commands exposed to the vicissitudes of the weather, suggest the propriety of an attempt to divest it of its gravest dangers by an intentional infection at a time when the sanitary environment of the men may be absolutely controlled. Inoculation for small-pox was practiced before the discovery of vaccination. Of late years, however, the efforts of sanitary officers have been so successful in controlling the spread of communicable diseases that few medical men would counsel the intentional propagation of measles among large bodies of newly organized and susceptible troops. The

military necessity which calls for the levy does not usually admit of this preliminary course of hospital treatment: nor does the experience of our recruiting depots and camps of organization indicate this early period of the history of a regiment as propitious for an encounter with disease: Men and officers are alike ignorant of military methods and of the ways of camp or barrack life. Privations are endured which a larger experience would have rendered wholly unnecessary, and many needless exposures are entailed upon the men. There is, moreover, in time of war an excitement in the atmosphere of a recruiting camp which would render the propagation of this disease a hazardous experiment, even if conducted under the supervision of veteran medical officers.

After some months of active service the troops become sobered down to the stern realities of war. They are better disciplined, better qualified to protect themselves and to appreciate and cooperate with efforts for their protection. They may possess fewer facilities than at an earlier period for meeting the attacks of disease: but they are able to utilize all that are available. They are perhaps, except in cases of unusual exposure and privation, better able to protect themselves against the accidental introduction of measles into their camp than they were formerly to submit to its intentional conveyance.

The aim of the medical officer is to prevent his men from becoming sick. Measures should be taken to exclude all known sources of infection; but should these fail and a man become affected with the disease, he should be promptly isolated for the protection of the others, and carefully guarded against the dangers that threaten his own safety. Blankets and articles of clothing used in common by the sick man and his intimates should be removed with him. Those men that have been most in contact with him should be restricted to open-air communication with others of the command until time has been afforded for further developments. The patient should be well sheltered in an equable and temperate atmosphere, warmly covered and attended with care and intelligence for the avoidance of unnecessary exposure.

Should a regiment or a portion of a larger command become affected arrangements should be made for its relief from duty, its isolation from the remainder of the troops and the appropriate treatment of its sick. In this way only may the epidemic be circumscribed and the affected men preserved for future service. The extracts that have been submitted show conclusively the evil consequences of injudicious management during the prevalence of measles in a command. The duty of the affected regiment should be to take care of itself until again fit for military service, guarding, meanwhile, against the extension of its contagion beyond the lines of its isolated camp. If the cases are numerous adequate accommodation should be provided lest, by overcrowding, an increased virulence be developed. On the subsidence of the epidemic the men who have escaped attack may be returned to active service, while the convalescents are retained or furloughed until restored to their normal condition.

Isolation proved inefficient in restricting the disease during the war: but there is no record of its having been systematically carried out. The disease was generally considered trivial by our medical officers, who realized its disastrous consequences only after it became too late to effect its suppression. Nevertheless it subsided among our white troops during the warm months of 1862 while new regiments were being organized and mustered into service. Fresh air apparently controlled its spread. Hence, in winter-camps exposed to the disease, efforts to prevent or quell an outbreak should be directed to the removal of con-

tagious foci and the dilution and disinfection of suspected atmospheres. In fact the systematic isolation and protection of the sick in hospital, with free ventilation and sanitary supervision for the as yet unaffected members of the command, may be regarded as the only trustworthy measures for the limitation or suppression of the disease and the mitigation of its possible consequences.

The following from the report of Ass't Surgeon BARTHOLOW, U. S. A.,* relates to the therapeutic management of the disease:

Many cases of measles, if left to themselves, terminate favorably. An increase in the excretion of urine, a smart diarrhœa, are the phenomena which mark the crisis and decline of the disease. We may have the opportunity, when the proper time arrives, of producing, imitating or favoring the occurrence of these critical discharges; but it would be idle to attempt to cut short an attack by such means at other periods of the disease.

In those cases where, from malignity of the poison or peculiar states of constitution, patients do not recover from the first impression of the morbid cause, and death is imminent from cerebral disease, intense pulmonary congestion or hyperæmia of the kidneys before the eruption appears, remedial measures have little power to avert a fatal issue. Congestion of organs essential to life is the chief source of danger. How are we to treat it? Coma and delirium are produced by engorgement of the vessels of the brain, by extravasations of blood on the hemispheres, by inflammation of the meninges and by exudation of lymph; coincident with these phenomena is, in many cases, suppression of urine. I have seen these symptoms much improved by a copious bleeding, but the patient died in every instance. Whiskey, no matter how freely administered, had no great efficacy. The true way, in my opinion, to treat this condition of the brain, is to excite the action of the kidneys by saline diuretics, to relieve the vessels by local cupping, being careful not to extract too much blood, to produce counter-irritation by hot sinapisms to the extremities and by saline cathartics, and to remove a portion of the blood by ligatures to the thigh, applied tightly enough to arrest the superficial venous circulation. It is not worth while to give calomel and antimonials in the vain hope of subduing inflammation; if these agents possessed this power time is not afforded for its manifestation.

The most important symptoms and the largest mortality are due to pulmonary complications. The morbid anatomy of the disease shows that a capillary bronchitis, accompanied by copious exudation, lobular pneumonia, an intense congestion of the vessels of the lungs and a gorged condition of the right cavities are the sources of danger: the left side of the heart is found empty. These pathological facts, if they mean anything, teach that stimulants are not indicated. In practice they produce only injury when administered in this state. Bleeding gives temporary relief, but the patients die if bled. Mercurials and antimonials do not relieve but only add complications; mortality is increased by their use. I think we ought to rely on counter-irritants and cups to the thorax, counter-irritants and derivatives to the inferior extremities, ligatures to the thighs to control the venous circulation and on remedies to maintain and increase the renal secretion. The best counter-irritant in these cases is turpentine applied as a stupe, but not permitted to remain long in one place, followed by warm applications. These remedial agents may be assisted by sinapisms, hot pediluvia and small doses of opium. Active diuretics should be avoided not only on account of the hyperæmia of the kidneys but of the irritable state of the mucous membrane of the intestinal canal. Bitartrate, bicarbonate and citrate of potassa are the proper remedies of this class. They should be given in small doses largely diluted. If the affection of the kidneys be a prominent symptom, cups and sinapisms should be applied to the loins. Remedies to control diarrhœa are saline cathartics with tincture of rhubarb, followed by astringents and opiates. When increased heat of the abdominal walls and increase in the number of dejections evidence increase in the hyperæmia of the submucous tissue and enlargement and thickening of the solitary glands and follicles of Lieberkühn, then dry or wet cups, turpentine stupes and sinapisms, followed by warm moist applications, are indicated.

The diet should consist of nutritive matters which may be taken up in the stomach and duodenum. Animal broths and small doses of wine are proper. If the intestinal lesion be not decided, milk, eggs, butter and fresh, ripe, acid fruits may also be added. In the stage of desquamation the skin is excessively sensitive to change of temperature: it is during this stage that pneumonia is developed out of lobular pneumonia and pulmonary engorgement, and diarrhœa and dysentery out of intestinal congestion. Olive oil, lard or glycerine is useful when applied to the desquamated surface. Carefully-prepared nutriment and stimulants become necessary, but the stimulation should not be excessive. With the decline of febrile action there is a progressive lowering of the vital powers; the kidneys resume their activity and diarrhœa usually supervenes,—and these phenomena, although often critical, may still further reduce the patient, and therefore require watching.

During this stage, also, lesions of various organs commence and progress without the knowledge of the physician, if he is not awake to the probability of such accidents: daily examination should be made of the organs likely to become affected. The typhoid state, which results when the intestinal lesion goes on unchecked, and when chronic pneumonia follows the lobular attack, should be treated by appropriate remedies. This state will be less alarming if proper nutriment has been supplied from the beginning, and if the excessive use of brandy or whiskey has not so impaired the process of digestion as to prevent the primary assimilation. It is constantly necessary to obviate the tendency to death. The physician should study this tendency, whether by the brain, the lungs or the intestinal canal, and be prepared to counteract it. In camp measles, more than in almost any other disease, is the physician's duty one of care and watchfulness.

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* See Lit. Appx, page 740.

III.—SCARLET FEVER.

Scarlet fever was rarely seen during the war. A few cases occurred at intervals in most of the large military commands, but the disease does not appear to have spread in any instance from the primary case. The records do not show whether this immunity was due to antecedent attacks or to insusceptibility developed by age and independent of previous exposures. Among the white troops 578 cases were reported, 70 of which, or 12.1 per cent., were fatal; among the colored troops the cases numbered 118, with 2 deaths, equivalent to a fatality rate of only 1.7 per cent. This was therefore one of the exceptional diseases less fatal to the negroes than to the white men.

The medical records contain only the following: 1 and 2, undoubted scarlet fever; 3, entered as a case of *purpura*, and 4, perhaps a sequel of measles, although regarded by the medical officers in attendance as a sequence of scarlet fever.

CASE 1.—Private Dominic Weyland, Co. G, 4th Minn.: age 25; was admitted May 10, 1863, with a sprained ankle, and was next day transferred to the convalescent ward, where he assisted as nurse. On June 1 he was readmitted and on the 2d scarlatina was diagnosed; pulse 120; skin hot; temperature 102° Fahr. Prescribed tartar emetic two grains, chlorate of potash eight grains, nitrate of potash one scruple, Flemming's tincture of aconite twelve drops, camphor mixture eight fluid ounces; to take a tablespoonful every four hours; the throat to be swabbed with a strong solution of nitrate of silver; chlorate of potash to be used as a gargle: gave also a full dose of castor oil and sponged the surface with tepid water. He was convalescent on the 7th, but had a slight weakness of the eyes. Returned to duty July 29.—*Lawson Hospital, St. Louis, Mo.*

CASE 2.—Private Charles H. Witham, Co. D. 31st Me.; age 21; was admitted May 7, 1864, with high fever and delirium; sore throat and a scarlet rash covering the whole of the body. Neutral mixture and muriate of ammonia in three-grain doses every four hours, with alum and chlorate of potash as a gargle, were used in the treatment. In four days the rash disappeared, the fever abated and the throat improved, but, as the patient was much prostrated, milk-punch was administered. On the 13th he was seized with great dyspnœa, excessive irritability of the stomach and extreme prostration. He died on the 16th. *Post-mortem* examination: The lungs were healthy. The pericardial sac contained eight ounces of colorless serum.—*Mower Hospital, Philadelphia, Pa.*

CASE 3.—Sergeant J. P. Taylor, Co. G, 5th Ill. Cav.; age 23; was admitted March 15, 1863, with purpura. A scarlet rash covered the lower extremities from the lower third of the legs to above the nates, except an irregular narrow strip on the inner aspect of the legs and thighs. It was most intensely developed anteriorly, but presented no tumefaction, vesication or other unusual characteristic except a little cuticular corrugation with much itching and a slight burning sensation. There was but little accompanying fever, although the patient was extremely prostrated and had headache with furred tongue and constipated bowels. Gave tincture of iron in thirty-drop doses in water every six hours; also ten grains of calomel and eight of Dover's powder to be taken at night and an ounce of Epsom salts in the morning; applied locally a solution of acetate of lead every four hours. The medicines operated well and next day there was no fever, pain or itching; the rash, which seemed indisposed to spread, was changing color by the deposition of a whitish or grayish pseudo-membrane in irregularly-shaped and sized blotches under the cuticle. This involved the entire extent of the rash except a few lines in width on the inner aspect of the thighs and legs around the margins of the strip above mentioned. On the morning of the 18th the fever assumed a typhoid character, the mouth and fauces becoming dry; a rough grayish elevated eruption with red areolæ appeared on the upper extremities, chest and face, extending into the mouth and fauces and covering the conjunctivæ. Added quinine and turpentine, with Dover's powder at night and an occasional aperient, to the treatment. The patient sank gradually, dying on the 21st.—*Hospital, 5th Ill. Cav.*

CASE 4.—Private James M. Myers, Co. C, 144th N. Y.; age 25; was received June 19, 1863, having been unfit for duty since December, 1862, and under treatment most of the time in the Fairfax Seminary hospital. He had been injured by a fall, and while suffering from its effects was taken with an eruptive fever which he says was measles, but, as it appears that his throat required cauterization and the glands of his neck were enlarged, the disease was probably scarlet fever. His feet and legs began to swell about April 15. The urine was scanty and contained only a trace of albumen, although showing under the microscope a few blood corpuscles and pale clots; no oil globules were present. He was treated with compound jalap powder, tincture of muriate of iron, bitartrate of potash and tincture of digitalis; but as his condition failed to improve he was discharged August 1 for debility.—*Satterlee Hospital, Philadelphia, Pa.*

IV.—ERYSIPELAS.

PREVALENCE AND FATALITY.—Among the white troops 23,276 cases of erysipelas were reported during the war period, equalling an average annual rate of 10.45 cases per thousand of strength. But these numbers do not correctly represent the frequency of the disease.

No doubt they give with fair accuracy the number of cases reported from the field, but erysipelas was a scourge of the hospital wards rather than of the regimental camps. How many cases were developed in the hospitals cannot be ascertained, nor, for this reason, can the fatality of the disease be learned. According to the reports the fatal cases constituted 8 per cent. of the total, but this is necessarily an exaggeration.

The disease prevailed to a greater extent in the camps of the Western than in those of the Eastern armies; during the four years, July 1, 1861, to June 30, 1865, the average annual rate per thousand men in the latter was 7.8, in the former 13.2. It was also more common or more fatal in the hospitals of the Central region than in those of the Atlantic commands; for during the period mentioned the deaths in the former constituted 10.2 per cent. of the cases and in the latter only 4.4 per cent. During these four years 924 deaths from erysipelas were reported from the Western hospitals in an average population of 19,456, and only 194 from the Eastern hospitals, which had an average population of 26,137.

Similar results were observed among the colored troops. During the three years of their service the cases of erysipelas numbered 1,536, or 8.38 annually per thousand of strength, and the deaths from the disease 247, or 16.1 per cent. of the cases. In the Atlantic region the cases averaged 5.4 per thousand men annually, with 12.1 per cent. fatal, while in the Central region the rates were 9.1 per thousand, with 17 per cent. fatal. Enquiry into the cause of these differences appears to point to insanitary conditions, mainly arising from overcrowding in the camps and hospitals of the Western commands.

Like small-pox and other diseases which owe their propagation in part to a concentration of organic emanations, erysipelas was somewhat more prevalent during the winter months, when warmth was sought at the expense of ventilation. See diagram facing page 624.

So far as can be ascertained the Confederate surgeons had an experience of erysipelas similar to that of our own medical officers. During the nine months, July, 1861, to March, 1862, 390 cases were reported from the Army of the Potomac, which numbered 49,394 men. This is equivalent to an annual rate of 10.5 cases per thousand of strength. The records of the Chimborazo hospital, Richmond, Va., make note of 22 deaths among 236 cases treated, a mortality of 9.3 per cent.

The prevalence and fatality of the disease among the rebel prisoners may be gathered from the figures of Table LIII.*

Sometimes erysipelas, as seen in the wards of our general hospitals, was connected with traumatism; in cases 1 and 23 of the subjoined series an injury of the knee or leg appears to have determined the attack. Generally, however, the disease was developed independent of a pre-existing lesion. To give emphasis to this fact Surgeon ALEXANDER MCBRIDE, in charge of the hospital at Camp Wallace, Columbus, Ohio, mentions a nurse, who, having received some injury to the face, was attacked four days later by erysipelas, which was manifested primarily on a feature that had escaped injury. Occasionally the trunk or the extremities were affected, as in cases 2 and 20–24, given below; but the face was the usual site, the ridge of the nose, the ear and the infraorbital region being the more common points of attack.

The contagious nature of the disease was regarded as undoubted by those medical officers who had the best opportunities for its study. In some hospitals where cases of erysipelas were treated in the general wards the disease affected a large number of the patients

* Supra, page 624.

under treatment for other maladies, particularly those debilitated by typhoid fever, measles or pneumonia. To relieve the inmates from this source of danger special wards were provided for the treatment of erysipelas. Few of the nurses in these wards escaped attack. The freedom of the surgical wards from erysipelas, as compared with the frequency of the disease in the medical wards, points definitely to communicability. In the Third Part of the Surgical Volume of this Work* it is stated that only .4 per thousand of the whole number of wounded had a record of erysipelatous complications. This statement, of necessity, underrates the frequency of traumatic erysipelas, as the records in many cases may have failed to note its occurrence. It indicates, however, the infrequency of the disease in the surgical wards. It is impossible to determine what proportion of the medical cases suffered from erysipelas: but, as suggestive of its frequency, it may be observed that eleven of the three hundred cases forming the *post-mortem* records of lobar pneumonia were thus complicated.† Again, of the forty cases herewith presented, nineteen were received into hospital with erysipelas, while twenty-one occurred in patients already in hospital. The surgeon dreaded the presence of erysipelas among his wounded and had every case at once isolated: the physician was less alive to the contagious nature of the so-called idiopathic erysipelas, and permitted cases to remain in the general wards until a larger experience demonstrated the necessity for their isolation.

Symptoms.—A chill ushered in the attack. This was followed by febrile reaction, sometimes accompanied by inflammatory and even diphtheritic appearances in the fauces. A few hours later an erysipelatous blush on some part of the cutaneous surface showed what was in prospect. In other cases, however, which generally ran a mild course, the disease began without premonitory symptoms of a character to attract notice: in case 8 the patient said he had never felt better in his life than he did a few minutes before the development of the local manifestations. Spreading gradually from the point of attack on the nose, cheek or ear the inflammatory blush extended, without abatement of the associated fever, over more or less of the face and scalp, subsiding, perhaps, on one side as it invaded the other. In cases of greater severity the pain and febrile excitement culminated in delirium: the tumefaction blotted out the patient's facial expression: the eyes were hidden by the swollen lids and bullæ rose upon the inflamed surfaces. This condition of aggravated suffering occurred at a time when the case, if mild, would have been ending in convalescence. It sometimes lasted for many days: in case 6 five days elapsed before signs of amelioration were observed. The disease terminated in desquamation and scabbing: yet occasionally, as in cases 2, 4 and 6, convalescence was delayed by the occurrence of a diarrhœal or dysenteric attack. Circumscribed purulent deposits were found in some of these cases, as in 7, which was prolonged for several weeks by suppuration in the lower eyelids, under the chin and in the superficial tissues of the posterior cervical region. The fever in the milder cases was generally sthenic: but when the disease was prolonged, severe, or occurred in a debilitated subject, the familiar symptoms of adynamia were rarely absent. Relapse, as in case 8, sometimes followed an injudicious exposure to the weather. Relapses or recurrences were generally less severe than the primary attack.

As contrasted with these mild cases the disease sometimes assumed a malignant or typhus-like aspect, characterized by the rapid development of coma and the appearance of petechial spots, which, as in 40, became quickly resolved into sero-purulent depositories.

* Page 851. † See *infra*, page 773.

Otorrhœa and deafness were frequent results of severe attacks. Parotid abscess, as in 25, not unfrequently found an exit through the external auditory meatus, and death, as recorded in 26, was sometimes to be feared from hemorrhage into the site of the disorganized gland. In 9, a convalescent with consecutive aural disease, died from the effects of a cold douche indulged in as a luxury during oppressively hot weather.

In dangerous cases, characterized by deeply seated inflammations, the brain and its membranes frequently became involved. In 27 the cerebral structures were attacked by way of the orbit. Cases in which the scalp was largely tumefied were generally associated, as in 18, with pronounced cerebral symptoms, due, according to the *post-mortem* records of 28, 29 and 30, to congestion or some excess of effused liquid; death by coma was the usual end of such cases. In 31, which was complicated by meningeal inflammation, death was hastened by a fall during the patient's delirium.

Sometimes, instead of the cerebral membranes, the serous lining of the pericardial sac became implicated; in 32 the heart was covered with fibrinous deposits and the cavity of the pericardium distended with purulent liquid.

The gravity of the erysipelatous attack was in many instances intensified by a concurrent inflammation of the fauces. In 33 the tongue was much swollen; in 7, 13, 17, 20 and 29 the fauces were inflamed and in 14 and 34 diphtheritic sloughs were formed. Tumefaction of the epiglottis by congestive or inflammatory infiltrations leading to occlusion of the rima glottidis was occasionally the immediate cause of death, as in a case mentioned by Surgeon SHUBAL YORK, 54th Ill.* Act. Ass't Surgeon DEWITT C. DAY, who had a large experience at the special hospital for erysipelas, Nashville, Tenn., observed that in the majority of cases the disease was first manifested on the mucous membrane, as is always the case in measles and scarlet fever; he inferred from this that a striking analogy existed between these diseases in their formative stage.†

In some cases, as 21 and 35, pneumonia appears to have been the immediate cause of death. DAY believed the pneumonia to be a result of the erysipelatous influence, and as an illustration of many cases that might be adduced, recorded that of a soldier who, after the amputation of his arm, was attacked with erysipelas at the site of the operation. In a few days the inflammation faded at the stump but spread rapidly over the chest and back. He had been carefully nursed in a ward kept at an equable temperature, but nevertheless pneumonia supervened and became intensified as the diseased action subsided on the surface.

A determination to the mucous membrane of the intestine was also observed in some instances. This, which occasionally caused death, as in cases 17 and 19, not unfrequently prolonged the period of convalescence in mild or favorable cases of the disease. Dr. DAY was of opinion, as the result of his observations, that the disease, when originating from or by extension involving the mucous membranes, was of a more dangerous nature than when confined to the skin and cellular tissue. So long as the skin alone was its seat its extension over a larger surface was not attended by a corresponding aggravation of the constitutional disturbance.‡

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* See his report, *infra*, page 672.

† *American Medical Times*, VI, New York, 1863, page 268.

‡ In *A Brief account of Epiaemic Erysipelas as it appeared at Molino del Rey, near the City of Mexico, during the months of February and March*, 1848,—*Charleston Medical Journal and Review*, IV, 1849, p. 27,—Surgeon J. P. EVANS, U. S. Vol. Service, states that a cutaneous inflammation was present only in about one-fifth of the cases. Internal parts, as the fauces, the salivary glands, the inner ear, the lungs or their pleural membranes, were seized at the onset; and almost complete relief to these parts followed the external manifestations of the disease. On the other hand, the sudden retrocession of the external inflammation always enhanced the severity and danger of the malady. Fortunately not many such cases were witnessed. One is mentioned in which erysipelas of the face disappeared suddenly, and diarrhœa, with constant tormina and extreme tenderness of the abdomen, ensued and proved fatal in a short time. The erysipelatous fever that affected the troops near the City of Mexico and the inhabitants of the surrounding country, appears

Mild or erythematous cases affecting the limbs or trunk ended in desquamation in four or five days. In the higher grades of the disease abscesses were formed in various parts of the subcutaneous and intermuscular tissues become infiltrated with purulent matter; in some cases gangrene was developed; occasionally the joints were involved and destroyed. Great exhaustion and prostration resulted from the profuse and prolonged discharges in such cases. Delirium aggravated the suffering, and the patient ultimately died exhausted by the continued drain or carried off by intercurrent diarrhœa or pulmonary congestion. Erysipelas of the head and face was generally regarded as more dangerous than an attack involving the trunk or extremities; but the accuracy of this opinion has not been established. Facial erysipelas was common, and in the majority of cases ran a mild and rapid course. Act. Asst Surgeon Washington Matthews, who had favorable opportunities for observing the disease in the erysipelas wards of the Rock Island hospital, Ill., considered that while cases involving the extremities were infrequent their course was usually prolonged by the progressive invasion of contiguous regions and their danger heightened by consecutive suppuration in the underlying cellular tissue. The progress of such cases to a fatal issue is illustrated by cases 20–24 of the following series:

CLINICAL REPORTS OF ERYSIPELATOUS CASES.

Case 1.—Private Samuel Gruniger, Co. A, 41st N. Y., was admitted July 28, 1861, with erysipelas of the left leg, which was of a fiery-red color and swollen to twice the natural size; it was purplish for eight inches above and six inches below the knee and terminated largely over the purplish parts. He had sprained the knee four days before; the resulting pain and swelling had been treated by local poultices. On admission a tepid bath was given, tincture of potash and tincture of iron prescribed and acetate of lead lotion applied. Next day the swelling had subsided a little; a dessert sulphate of magnesia and tartar emetic was administered and cold water was substituted for the local lotion. On the 31st the cuticle around the joint separated in scales and there was a general improvement in the patient's condition. On August 1 there was a slight blush on the knee, but mobility was perfect and there was no pain, swelling or constitutional disturbance. Next day pain with some redness returned on account of using the joint too freely. On the 3d there was much redness, with pain along the inner aspect of the knee. A cathartic of calomel, jalap and gamboge was given. The patient was transferred on the 5th and was discharged from the service November 25.—*Seminary Hospital, Georgetown, D. C.*

Case 2.—Sergeant David W. Thomas, Co. B, 20th Ohio, was admitted Sept. 16, 1863, with erysipelas affecting the anterior tibial region; pulse 100, feeble; tongue moist but coated; appetite poor; skin natural. Gave Dover's powder every six hours, instituted tincture of iron before meals and tincture of iodine in water for topical use. On the 18th sulphate of magnesia was given for constipation. The inflammation subsided on the 19th and next day full diet was allowed. Convalescence was interrupted October 2 by an attack of diarrhœa, which lasted four days. The patient was returned to duty November 14.—*Second Division Hospital, Alexandria, Va.*

Case 3.—Judson L. Marsh, a *rebel prisoner*, was admitted April 15, 1865, with erysipelas. He had been in prison since December of the previous year and had suffered from chills and various sores. He had scorbutic stains on his limbs and was subject to constipation, seven days sometimes passing without a movement of the bowels. The erysipelatous attack began, without premonitory symptoms, by a swelling of the lower eyelid of the right side on the morning of the 14th. He was treated with castor oil internally and rosin ointment as a local application. The swelling never extended very far and a half inches in diameter. It subsided in a few days and was followed by desquamation. He was returned to barracks on the 28th.—*Act. Asst Surgeon Washington Matthews, Rock Island Hospital, Ill.*

Case 4.—Private Frederick G. Johnson, Co. E, 50th Ala., was committed at prison Feb. 18, 1865. He had been suffering from chills and diarrhœa for a long time previous to his capture. He was admitted on April 6 for weight, debility and diarrhœa. On the 9th he was seized with lassitude, chills, fever and pain in the glands of the neck. Next day erysipelas set in, and on the 23d he was transferred to Ward C for treatment. One drachm of saturated

solution of chlorate of potash was given internally three times a day, and the same solution was used on lint as a local application. On the 24th the inflammation began to subside and the patient's eyes became visible. By the 26th he was convalescent and complained of nothing but weakness. Desquamation was completed on May 2, after which his strength was slowly regained under nourishing diet, tonics and stimulants. For a time a slight dysenteric attack delayed his recovery, but by the 12th he was able to return to barracks.—*Ass't. Ass't Surgeon Washington Matthews, Rock Island Hospital, Ill.*

Case 5.—Isaac B. Reid, a rebel prisoner; age 27; was admitted April 12, 1865. He had always been in good health, but for an occasional fit of ague and an attack of variloloid, the latter having occurred subsequent to his capture. A swelling, mistaken for mumps, began April 4 and increased for a week, during which time he became very weak, as he was unable to eat anything. At length an erysipelatous blush appeared on the surface, when the swelling became reduced in size. Castor oil and turpentine emulsion were prescribed for internal use and resin-cerate with turpentine as a local application. His tongue was dry, brown and cracked on the 16th, on which day a pint of ale was prescribed for daily use. On the 18th milk-punch was substituted. The tongue at this time continued dry and brown, and was protruded with difficulty; the inflammation had moved from the right to the left side of the face; desquamation was in progress on the right side; pulse rapid but soft; appetite poor; two or three evacuations from the bowels daily. The erysipelas had extensively spread over the 20th, when the tongue became clean and moist and the appetite, strength and pulse improved, but some injection of the conjunctiva remained and there was complaint of pain in the ear. The internal use of turpentine, which has acted as a stimulant, proved enough to aggravate nor alleviate the symptoms nor to affect the condition of the tongue. He was returned to barracks May 8.—*Ass't Surgeon Washington Matthews, Rock Island Hospital, Ill.*

Case 6.—Private Hiram Michael, Co. C, 1st Pa., had a chill April 12, 1864, while at Camp Cadwallader. This was followed by headache and sore throat, and on the 16th by redness and swelling of the right side of the face, which led to his admission on the following day. Tincture of iron was prescribed with full diet; the affected parts were painted with tincture of iodine and a lead solution was applied. On the 18th the whole of the upper part of the face was involved; the eyes were swollen and closed and several bullæ appeared on the left ear and side of the face. Quinine in two-grain doses hourly was added to the treatment, with beef-tea and egg-nog. Delirium supervened on the 20th, when anodynes were given, but the symptoms did not begin to show amelioration until the 25th. He was convalescent on the 28th and was returned to duty May 24.—*Turner's Lane Hospital, Philadelphia, Pa.*

Case 7.—Private Andrew J. Mortier, Co. E, 115th Ohio; age 32; a man with a history of chills, chronic diarrhœa, recurring sore throat and injury to the loins by a fall from a mule, was admitted Nov. 9, 1862, with hot and dry skin, full pulse, 100, furred tongue, constipated bowels, anorexia, great thirst, headache and drowsiness. Gave every three hours two grains each of calomel and bicarbonate of soda and one grain of ipecacuanha, to be followed next morning by a small dose of castor oil. Next day the febrile symptoms continued and the tonsils were swollen. Gave a saturated solution of chlorate of potash as a gargle. A slight blush was observed under the eyes in the evening; several stools were passed after taking the oil. The fever continued on the 11th; the blush [illegible] with a tingling pain in the cheeks; the throat was very sore and there was some delirium [illegible]. The bowels were discontinued. On the 12th the cheeks, eyelids and forehead were in deep red, acute and the eyelids closed. Skin hot and doughy; bullæ had formed on the cheeks; delirium; aphonia; tongue furred; pulse 90 and soft. Gave beef-essence and stimulants; applied cotton lightly over the swollen parts, but towards evening this caused pain and flour was used instead. By the 14th the face was discolored, but the swelling appeared [illegible] the bullæ had burst and were forming scabs; the delirium continued. Gave tincture of iron, brandy and egg-nog, and replaced the flour by glycerine. Next day persulphate of iron, ten grains in two ounces of glycerine, was used locally. The delirium did not subside until the 18th; on [illegible] and very weak, as it [illegible] this day. Next day desquamation was progressing but the pyrexia continued [illegible]. The pulse was [illegible] compressible and intermittent. On the 20th the patient was able to sit up; the [illegible] and chicken-soup were allowed. The sputa [illegible] and [illegible] and [illegible] and

grain, at bedtime: extra diet. Next day iron and quinine were prescribed, with porter, milk-punch and ice-cream. He improved under this treatment. On the 25th he was able to sit up and on the 31st to walk about the ward. At this time, while suffering from the oppressive heat, the patient went into the wash-room and held his head for several minutes under the hydrant. He had then to be carried to bed; pulse 120; skin very hot; severe headache; great distress. Gave one drachm of brandy every half hour. He died early next morning.—*Mower Hospital, Philadelphia, Pa.*

Case 10.—Private Michael Brown, Co. L, 25th N. Y. Cav.; age 30; admitted Nov. 26, 1864, with prolapsus ani and piles, was taken on the 29th with a chill followed by fever, pain in the bones, nausea and an erysipelatous swelling of the right side of the face, closing the right eye completely. Gave tincture of iron, opium, calomel and ipecacuanha; applied sugar of lead to the face; special diet. He was discharged March 2, 1865, because of chronic ulcer over the left tibia, piles and strabismus.—*Finley Hospital, Washington, D. C.*

Case 11.—Private Patrick Firney, Co. B, 31st N. Y., while under treatment for scrofulous ulcers of the neck, had a chill Nov. 15, 1862. Next day he was feverish. A saline purgative was ordered, with small doses of acetate of ammonia and low diet. On the 17th the left ear was affected with erysipelatous redness. Tincture of iron was prescribed. Next day, as the disease evinced a tendency to spread, a broad line was painted with tincture of iodine around the scalp. The inflammation began to subside on the 22d; a nutritious diet of eggs, chicken and oysters, with an allowance of milk-punch, was prescribed. He was able to sit up on the 26th, and was transferred December 2 to another ward to await discharge.—*Satterlee Hospital, Philadelphia, Pa.*

Case 12.—Private Michael Ruff, Co. M, 8th N. Y. Cav.; age 33; was placed on duty in the kitchen Aug. 30, 1863, while under treatment for opacity of the cornea resulting from an acute conjunctivitis. December 30: Pain, swelling and redness back of left ear; constipation. Gave five grains of calomel and ten of rhubarb at once. Jan. 1, 1864: Copious stools; pain and swelling increased. Gave syrup of iodide of iron three times a day and applied flaxseed mucilage. 2d: Erysipelas well marked. Continued the iron and applied cranberry poultice over the entire face; gave brandy, milk-punch and extra diet. 3d: Inflammation increased on right side of face; constipation. Gave castor oil. 4th: Easier; stool; slight delirium. Gave small doses of Hoffmann's anodyne every hour. 5th: Slight delirium; tongue dry and heavily coated; pulse 140. 6th: Tongue cleaning; pulse full and soft, 98: skin moist; features more natural. 8th: Removed cranberry poultice; reapplied flaxseed mucilage. 9th: Pulse small and quick; delirium. Gave half an ounce of brandy every hour. 10th: Easier; inflammation subsiding. 15th: Improving slowly; abscesses at back of head. Applied poultice. 21st: Opened two abscesses. 30th: Improving steadily: able to sit up. February 10: On light duty. April 23: Returned to duty.—*Mower Hospital, Philadelphia, Pa.*

Case 13.—Private Floridan Covert, Co. I, 86th N. Y.; age 27; was admitted Dec. 14, 1862, deaf from disease of the middle ear. Nothing of interest occurred in his case until Jan. 29, 1863, when he was seized with chill followed by violent fever, rapid pulse, intense headache, pain in the back and sore throat. Small-pox was anticipated, as some cases of this disease were in the house at the time; but about twenty-four hours after the chill a red erysipelatous spot appeared on the nose. The inflammation spread so rapidly that in thirty-six hours it had overspread the face, closing the eyes entirely. The patient was so prostrated by the violence of the attack that stimulants were necessary to keep him from sinking. Tincture of iodine and afterward collodion were applied to the affected surface and appeared to act beneficially. He was transferred to another ward two weeks later somewhat weak but wholly recovered from the erysipelas.—*Satterlee Hospital, Philadelphia, Pa.*

Case 14.—Private Henry Webber, Co. C, 31st N. Y., while under treatment for granular lids was taken, Nov. 23, 1862, with erysipelas of the face and complained of pain in swallowing. On examination the throat was found extremely swollen externally and internally, and the tonsils and posterior nares covered with a whitish pultaceous membrane, portions of which could be wiped off with a sponge; the pulse was rapid and unequal; eyes red and injected and the patient much prostrated and alarmed at his condition. The treatment consisted of twenty drops of muriated tincture of iron every two hours in a tablespoonful of a saturated solution of chlorate of potash; the tonsils and throat were well brushed with an eighty-grain solution of nitrate of silver and the erysipelas circumscribed with tincture of iodine; the diet was stimulating and nourishing. The mixture was continued in gradually decreasing doses for ten days, after which the patient was considered cured.—*Satterlee Hospital, Philadelphia, Pa.*

Case 15.—Private Fred. Bachman, Co. D, 1st N. Y. Art'y; age 35; while under treatment for rheumatism, or a lameness of the right side from injury, was seized, Jan. 4, 1863, with erysipelas of the face, attended with much fever, severe headache and drowsiness. On the 18th the blush extended over the forehead and anterior portion of the scalp, pitting on pressure and developing bullæ. A solution of sulphate of iron, half an ounce in a pint of water, was applied by means of compresses; tincture of iron was given with Dover's powder at night; milk diet. The inflammation subsided by the 21st; but fetid matter came from the left ear, which was immediately washed out with a solution of nitrate of silver. The patient was delirious on the 25th, but by the end of the month he was able to sit up. The discharge had nearly ceased, leaving deafness on that side. A blister was applied behind the ear. He was discharged March 30 because of deafness of one side and lameness from injury occasioned by a horse falling on him.—*Satterlee Hospital, Philadelphia, Pa.*

Case 16.—Private Lewis J. Russell, Co. B, 87th Ill.; age 21; was admitted April 17, 1863, with an abscess of the parotid gland, which was opened on the 27th. The gland of the opposite side became affected, and on May 1 erysipelas set in, involving the whole of the face and scalp. A severe diarrhœa supervened on the 17th, and death occurred on the 20th.—*Lawson Hospital, St. Louis, Mo.*

Case 17.—Private William W. Paxton, Co. H, 114th Ohio, was admitted March 21, 1863, with diarrhœa following typhoid fever. On the 25th he had a chill which ushered in an attack of erysipelas of the face. Iron, quinine

and brandy were administered and iodine applied to the surface. The erysipelas disappeared next day, but the patient's strength failed, and he died on the 28th.—*Lawson Hospital, St. Louis, Mo.*

CASE 18.—Private Asa Fry, Co. K, 83d Ind., was admitted March 21, 1863, in a weak condition resulting from typhoid fever and diarrhœa; he was unable to speak louder than a whisper. On the 25th he had a bad cough and his throat was red and congested. Applied a strong solution of nitrate of silver. On the 28th tincture of iron and chlorate of potash were prescribed. A chill on April 3 was followed by erysipelas of the face, beginning on the nose. Symptoms of inflammation of the brain attended the rapid extension of the disease to the scalp. Death took place on the 9th, after thirty-six hours of coma.—*Lawson Hospital, St. Louis, Mo.*

CASE 19.—Private Robert Vantessen, Co. E, 12th Va. Cav.; age 59; was admitted Oct. 15, 1863, on account of an injury to the chest by a fall from horseback. In December he was attacked with phlegmonous erysipelas, which first affected the head. In January, 1864, the eyelids were œdematous and the neighboring subcutaneous tissues infiltrated with serum. Treatment at this time was palliative and expectant, but, the disease extending, tincture of iron, quinine and diffusible stimulants were administered freely, with generous diet and Dover's powder at night; strong tincture of iodine was applied frequently to the affected parts. Pus was discharged copiously—as much as eight ounces daily—the inflammation at this time involving the legs, arms and chin. Colliquative diarrhœa supervened; a large bedsore on the back caused much suffering. He died March 4.—*Cumberland Hospital, Md.*

CASE 20.—Private Jno. Thornton, Co. E, 16th Iowa; age 23; was admitted Oct. 4, 1863, pale and feeble from malarial fever, with torpid bowels, pain in the region of the spleen and some cough with white ropy expectoration. On December 2 he was so much improved as to be able to assist as nurse; but on the 7th he had a chill, followed next day by fever with heat and soreness in the left axilla. Laxatives, quinine and low diet were prescribed. On the 9th the throat was sore and the tumefaction about the left shoulder extended upward into the neck and downward along the trunk. On the 10th the breath was offensive and swallowing was accomplished with difficulty. The quinine was omitted and eight-grain doses of iodide of potassium substituted; tincture of iodine was applied to the inflamed parts. On the 12th tincture of iron was given in place of the iodide of potassium; port wine, two ounces daily, was also prescribed, with special diet and morphia at night. The fever abated somewhat on the 15th, but the patient was greatly prostrated; pulse 120; the swelling extended from the axilla to the ileum. A chill, with other indications of suppuration, was noted on the 18th; on the 20th the inflammatory redness extended as far as the knee and on the 22d to the foot. At this time the patient was greatly emaciated; he slept but little and had no appetite; an opening just below the iliac crest gave exit to a purulent discharge. Incisions above the crest on the 28th liberated a pint or more of pus. By Jan. 5, 1864, his condition was considerably improved; he rested better and was able to sit up in bed. Aromatic sulphuric acid and the sulphates of iron and cinchonia were administered. On the 12th an opening made on the outside of the thigh permitted a large quantity of pus to escape. Three days later an opening was made on the shoulder. Matter was, meanwhile, discharged freely from all the apertures. Beer or wine was taken at desire; but the patient was much depressed. He continued to lose strength until the 24th, when the discharges became somewhat reduced and the appetite improved; but on the 28th diarrhœa supervened and persisted, with occasional remissions, to the end. Apertures for the escape of pus had to be made along the leg and foot. He died exhausted April 1.—*Hospital, Quincy, Ill.*

POST-MORTEM OBSERVATIONS.

CASE 21.—Robert Sparks, a citizen of Missouri, was admitted Jan. 11, 1865, with erysipelas of the arm and forearm. The skin and cellular tissue became destroyed, exposing the muscles for three-fourths of the circumference of the arm from the insertion of the deltoid to the wrist-joint. The patient was treated with quinine and muriated tincture of iron and did well for seven or eight days, but pneumonia set in, the ulcer assumed an unhealthy appearance and death occurred February 7. *Post-mortem* examination: The upper and lower lobes of the right lung and the lower lobe of the left lung were hepatized gray; the middle lobe of the right lung appeared to be healthy; the upper lobe of the left lung was highly congested. The heart was normal. The liver was healthy; the spleen twice its normal size and anæmic; the intestines healthy; the mesenteric glands enlarged.—*Act. Ass't Surgeon James McCortney, Rock Island Hospital, Ill.*

CASE 22.—Private John Farlow, Co. C, 28th Pa.; age 44; was admitted March 29, 1864, with erysipelas of the right lower extremity. He had been taken sick while at home on furlough. On admission the limb was red and swollen to the middle of the thigh, its color livid and its temperature lower than normal. About April 10, as the erysipelatous inflammation subsided, the knee-joint was found to be swollen and distended with liquid; this distention increased for a week and then gradually diminished, the pain also ceasing. At the beginning of May the left knee became swollen and painful, and on the 11th, when it had attained the size of a man's head, it opened spontaneously and discharged about a pint of sanious pus. At this time a bedsore formed over the sacrum and rapidly enlarged; another appeared shortly after over the right hip. Death took place June 3. *Post-mortem* examination: Body much emaciated; both lower extremities greatly swollen. There was some hypostatic congestion of the lungs, and the cavities of the heart contained fibrinous clots. The liver was fatty and slightly larger than normal; the other abdominal viscera were healthy. An incision into the right knee-joint gave exit to a pint of pus; the articular surfaces of the femur and tibia were much eroded, nearly the whole of the cartilages having disappeared. A similar condition was found on the left side. The veins were carefully examined without the discovery of anything abnormal.—*Act. Ass't Surgeon Wm. R. Dunton, Cuyler Hospital, Philadelphia, Pa.**

* An account of this case, submitted by Dr. JOHN ASHURST, jr., was published in the *Proceedings of the Pathological Society of Philadelphia, Pa.*, Vol. II, 1867, page 172.

CASE 23.—John W. Rogers; age 22; a rebel conscript; was admitted April 1, 1865, with erysipelas and gangrene of the right lower extremity. He had suffered much from bilious and intermittent fevers followed by dropsy. For seven years his legs and feet had been more or less œdematous. A week before admission he fell over a chair and the injury thus inflicted on his leg aggravated the chronic swelling and developed erysipelas, which was preceded by a chill. A saturated solution of chlorate of potash was ordered to be applied copiously to the limb. Delirium came on during the night and continued until the morning of the 4th; during this time he would rise from bed and run about the ward. Nitrate of silver was applied around the limb to confine the erysipelas, but it proved useless. Bromine was then used and milk-punch and tincture of iron ordered. Large blood-blisters formed on the leg, which began to look yellow, black-spotted and gangrenous. Labarraque's solution was used as a dressing. After the delirium subsided the patient became comatose and died on the 9th. *Post-mortem* examination revealed nothing but the gangrene of the limb.—*Act. Ass't Surgeon Washington Matthews, Rock Island Hospital, Ill.*

CASE 24.—Josiah R. Small, a rebel conscript from Missouri, was admitted Dec. 6, 1864, with acute pneumonia. The patient had an attack of pneumonia in 1863 and has suffered more or less since then with pain in the left side. On admission his tongue was coated except at the margins, which were red; bowels regular; pulse 90; respiration hurried; he had cough with some expectoration; pain in the right side, which was dull on percussion and yielded crepitant râles over the mammary region. He improved under treatment, and when, Jan. 6, 1865, he was taken with erysipelas all signs of the lung disorder had disappeared. The erysipelas ran its course in four days, but was immediately followed by an abscess in the hip, which was opened on the 25th, discharging about a pint of pus on that day. On the 27th he was transferred to the surgical ward in good spirits, with a fair share of strength and a good appetite. The treatment while in this ward consisted of flaxseed poultices with quinine and Dover's powder, and afterwards, for six days, simple dressing, with a powder given every six hours consisting of three grains of tannin and one and a half each of opium and camphor. On February 5 poultices were again ordered and the face and hip directed to be painted with tincture of iodine, which treatment was continued until his return to the medical ward on the 9th, when his face was found to present the desquamating cuticle consequent on a recent erysipelatous attack. He was emaciated to a great degree, exhaled an exceedingly offensive stench from his person and had deep bedsores on his sacrum and on each iliac crest; his left lower extremity showed almost every process of bone in consequence of the emaciation, while his right limb was swollen to a large size throughout its entire length in consequence of purulent infiltration. *This swelling was completely reduced in the course of twenty-four hours* by the application of a tight bandage from the toes to the hip, with the further effects of causing a large quantity of fetid pus to be discharged from the old aperture and of entirely relieving the excruciating pain which the patient formerly experienced in the swollen limb. The bandage was readjusted twice daily. The position of the patient was frequently changed by an attendant for the purpose of taking the pressure off the bedsores; his surface was cleansed once daily and disinfectants freely used about the bed. Ale, milk-punch and whiskey were successively used as stimulants; lead lotion was applied to the bedsores and an astringent pill given when needful. He died on the 20th. *Post-mortem* examination: The body was extremely emaciated, the abdomen concave; the integument abraded over nearly every bony prominence; the course of the purulent deposit among the muscles of the hip, thigh, leg and foot was distinctly marked; the bedsores had not increased to any noticeable extent since his admission. There was some congestion and blueness of the bowels, particularly of the large intestine; a part of the ileum, three inches long, was invaginated.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

CASE 25.—Private William P. Bracken, Co. G, 86th N. Y.; age 22; was admitted Oct. 2, 1864, with chronic rheumatism. About May 1, 1865, he had an attack of erysipelas of the face, which gradually extended to the scalp and back of the neck. He was treated with tincture of iron internally and a lotion of half a drachm of sulphate of iron to the pint of water. The case progressed favorably and by the 6th the erysipelas had altogether disappeared; but the patient was feeble and had some irritability of stomach, which was checked by hydrocyanic acid in effervescing draughts; after which stimulants and a nutritious diet were ordered. On the 8th he complained of pain over the left parotid, where an abscess, opened next day, discharged a quantity of fetid pus; there was also a discharge of pus from the left ear. From this date he refused nourishment and sank rapidly, dying on the 15th. *Post-mortem* examination: The cerebellum was softened, but no abnormal effusion was observed beneath the membranes. Both parotid glands were enlarged. The lungs and abdominal viscera were normal.—*Third Division Hospital, Alexandria, Va.*

CASE 26.—Private James Montgomery, Co. E, 110th Pa.; age 27; was admitted March 29, 1864, with erysipelas. He was delirious and in low condition, his face and scalp swollen and doughy. One grain of quinine and five drops of tincture of iron were given every two hours, with milk-punch and beef-essence; mucilage of slippery elm was applied to the face and scalp and flaxseed poultices over the parotid glands. On April 11 the left parotid became swollen and on the 15th the right submaxillary gland; the swelling of the latter subsided on the 23d, but the parotid continued much enlarged, indurated and painful. On the morning of the 24th blood and pus escaped from the left ear; an hour later an incision was made into the softest part of the swelling, about one and a half inches below the angle of the jaw, giving free exit to a quantity of pus. At midnight a pint of blood issued from the ear and the incision, and thereafter, for four days, hemorrhage occurred at intervals notwithstanding efforts to suppress it by tents saturated with solution of persulphate of iron. Meanwhile the erysipelas reappeared and diffused itself over the entire face. Pus continued to be discharged and the tumor became much reduced in size; but at 5 A. M. of May 2 twelve ounces of blood came from the ear and abscess, and a further loss occurred while readjusting the styptic plugs on the giving way of part of the wall of the abscess. At this time the patient became inclined to stupor and there was much jactitation, which was equal on both sides, but after 11 P. M. motion on the right side ceased and clonic spasm was developed on the left side; the right eye became glassy and its pupils dilated, while the left continued bright and had its pupil contracted: the left radial pulse was absent during the spasm, the right radial pulse was constant. He

died at 2.30 A. M. of the 3d. *Post-mortem* examination: Rigor mortis well marked; skin blanched. The brain was healthy but pale; the thoracic and abdominal viscera anæmic. The integument on the left side of the face and neck was swollen, softened and discolored. There was an opening through the lower wall of the external auditory canal and an orifice below the ear large enough to admit four fingers, leading into a large cavity filled with soft coagula and the disorganized remains of the parotid gland. The arteries in this cavity are supposed to have been intact, as no extravasation took place from them upon injecting from the arch of the aorta. The ramus of the lower jaw was denuded of periosteum; a probe was passed readily from the lateral sinus through the jugular foramen into the abscess; the external jugular vein was healthy below the abscess but not traceable through the cavity. (The point of special interest in the pathology of this case is the suppuration of the parotid gland, a most rare occurrence, and probably dependent on the condition of constitution induced by the erysipelas. Death was the result of unavoidable hemorrhage, probably from the internal jugular vein, it having been involved in the disorganization of the gland. The identity of the cerebral symptoms immediately before death with those of compression is worthy of mention, the actual pathological condition of the brain being that of anæmia.)—*Cuyler Hospital, Philadelphia, Pa.*

CASE 27.—Private Robert Work, Co. D, 83d Ohio; age 27; admitted March 21, 1863, with diarrhœa. He was very weak, had a slight bronchitis and an ulcer on the cornea. Erysipelas of the nose and right cheek was developed on April 12. Quinine and iron were given freely and iodine applied locally. He died on the 24th. *Post-mortem* examination: There was pus in the anterior chamber of the right eye, traceable along the course of the optic nerve to the brain, which was congested. The lachrymal gland was softened. The bones forming the orbit were denuded by purulent infiltration.—*Lawson Hospital, St. Louis, Mo.*

CASE 28.—Private Solomon Osborne, Co. F, 10th East Tenn. Cav., was admitted Jan. 27, 1864, with measles. On February 6, before the eruption had entirely disappeared, he was attacked with facial erysipelas. He died on the 11th. *Post-mortem* examination: The scalp was œdematous, the calvaria thick, the brain and its membranes much congested. There were slight pleuritic adhesions on the right side; the lungs weighed forty-nine ounces and were congested posteriorly; the bronchial membrane was injected. The inner surface of the pericardium was yellowish and softened; the heart soft and easily crushed between the fingers; the arch of the aorta atheromatous. The peritoneum was congested. The mucous membrane of the stomach was injected and thickened; that of the small intestine somewhat injected, of the large intestine thickened and softened. The liver was cirrhosed; the gall-bladder full; the spleen soft; the kidneys much injected, the left showing a cyst with a drachm of liquid. The blood in the veins was dark and semifluid.—*Act. Ass't Surgeon C. S. Merrill, Hospital 19, Nashville, Tenn.*

CASE 29.—Private Charles Agugo, Co. K, 1st Mich. Sharpshooters, was admitted May 16, 1864, with rheumatism. There is no record of his case until Jan. 7, 1865, when he was attacked with erysipelas, ushered in by a decided chill. The fauces and right side of the face first became affected; the inflammation then crossed the nose and involved the entire left side of the face; there was much swelling and both eyes were closed. He was treated with tincture of iron, quinine, stimulants and a nutritious diet. Delirium set in on the 17th. He died comatose on the 19th. *Post-mortem* examination: The membranes of the brain were highly congested. Other organs normal.—*Act. Ass't Surgeon Lewis Heard, L'Ouverture Hospital, Alexandria, Va.*

CASE 30.—Private Nathan Sprechor, Co. A, 99th Pa.; age 21; was admitted Nov. 30, 1864, with pneumonia, from which he had recovered sufficiently to do light duty, when, on Feb. 23, 1865, his right ear became inflamed. A blister was applied behind the ear and opium and blue-pill administered. On March 8 he became affected with nausea, and an erysipelatous inflammation spread from his right ear to his neck. Ipecacuanha was given and afterwards veratrum viride, and the inflamed parts were covered with cold flaxseed tea; but the inflammation extended to the side of the face and delirium came on. Tincture of iodine was applied and a lotion of sulphate of iron, with quinine and iron internally; but the disease spread rapidly over the head, neck and upper part of the chest, and the patient died on the 16th. *Post-mortem* examination: There was a slight effusion in the ventricles of the brain and two ounces of serum at the base; the cerebellum was softened.—*Third Division Hospital, Alexandria, Va.*

CASE 31.—Private Felix Kennedy, Co. B, 10th Vt., was admitted Nov. 25, 1863, suffering from facial erysipelas, more marked over the left frontal region, where the disease encroached upon the scalp; pulse frequent and feeble; tongue furred; skin dry and rough. The patient's aspect and general condition indicated habits of intemperance. Stimulants and cold-water dressings were employed. There was much gastric irritation during the progress of the case,—even liquid nourishment given in small quantity was occasionally rejected. On the night of December 4 there was a tendency to low delirium; but on the following day the mind was apparently clear. The inflammation of the face and scalp was not at this time so marked as on admission, but his pulse continued weak and frequent and his stomach rejected everything. Next night the delirium returned, and during its continuance the patient opened a window and fell to the ground, a distance of twenty feet, broken, however, by striking the roof of an adjoining piazza. When brought back he complained of pain in the lumbar region and in the right ankle, also in the left side of the chest near the angles of the sixth and seventh ribs. He died on the 8th. *Post-mortem* examination: In the brain were evidences of meningitis; the lungs were crepitant; the heart, liver and kidneys fatty; the stomach congested and its mucous membrane thickened.—*Central Park Hospital, New York City.*

CASE 32.—William H. Rushing, a citizen of Tennessee; age 42; was admitted March 5, 1864, with erysipelas. Died 15th. *Post-mortem* examination: The face was swollen. There was some congestion of the bronchial tubes in the left lung. The pericardium was distended with purulent liquid: the heart covered with fibrinous deposits: the endocardium normal. The liver, spleen and kidneys were healthy: the intestines slightly inflamed.—*Hospital No. 1, Nashville, Tenn.*

CASE 33.—Private Francis Noolin, Co. H, 110th Ohio: admitted Nov. 23, 1863: died Jan. 12, 1864, of erysipelas

and glossitis. *Post-mortem* examination: Tongue much swollen and completely filling the mouth: spleen very large and soft. Other organs healthy.—*Ass't Surgeon Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

CASE 34.—Private Peter W. Bradburn, Co. A, 9th N. Y. Heavy Art'y; age 52; was admitted Dec. 8, 1864, with intermittent fever. He recovered, but on Jan. 27, 1865, was attacked by erysipelas of the head. Tincture of iron was administered internally and a lotion containing acetate of lead and laudanum was applied. On the 29th the patient's head was greatly swollen, pulse 120 and very weak; he was unable to swallow and his throat and tonsils were extensively ulcerated; he was delirious at night. Beef-tea and brandy were given freely by injection; the throat and mouth were mopped with a solution of the chlorate of potassa and muriatic acid; a solution of half an ounce of sulphate of iron in a pint of water was applied to the erysipelatous parts and morphia administered at bedtime. During the following day the patient expelled a large amount of pseudo-membrane from his throat. On the 31st an aqueous solution of bromine, containing a half drachm to the pint, was substituted for the iron solution as a local application. Death occurred on February 7. *Post-mortem* examination: The mucous membrane of the small intestine was much injected and softened; Peyer's glands were prominent, as in the early stages of typhoid fever. [The condition of the throat and respiratory organs is not recorded.]—*Act. Ass't Surgeon E. R. Ould, Hospital, Frederick, Md.*

CASE 35.—Private George Washington, Co. M, 10th Ill. Cav., was admitted March 24, 1864, with erysipelas, and died on the 27th. *Post-mortem* examination: The scalp and neck were greatly swollen. There were recent pleuritic adhesions on both sides, and about six ounces of serum with some broken-down lymph in the right pleural sac; the lungs were much congested. The heart contained large light-yellow clots. The liver was fatty and weighed eighty-two ounces; the spleen, thirteen ounces, was pulpy and of a dull purplish color. The stomach and kidneys were healthy.—*Hospital No. 1, Nashville, Tenn.*

CASE 36.—Private Benjamin Barnes, Co. K, 5th Md.; age 59; was admitted from Slave Pen prison Jan. 3, 1865, with pleurisy. The acute symptoms had subsided under the use of anodynes, diaphoretics and sinapisms to the chest, when a swelling of the under lip and right cheek and a gangrenous condition of the mouth were discovered, the flesh hanging in black shreds. Nitrate of silver was applied and a mouth wash used containing chlorate of potassa and creasote. On February 1 erysipelas of the face set in and was treated with tincture of iron internally and locally, milk-punch and nourishing diet. He died on the 9th. *Post-mortem* examination: The salivary glands were enlarged. The anterior portion of the left lung was coated with pseudo-membrane and adhered to the thoracic parietes; the left pleural sac contained a considerable quantity of effused liquid; the bronchial mucous membrane was of a dark-purple color. The pericardium was full of clear yellow serum and the heart distended by a soft yellow clot. The liver was large but otherwise normal; the spleen large and pale; the kidneys granular. The stomach was pale and contained several black masses, apparently clotted blood; nothing abnormal was observed in the rest of the alimentary canal.—*Act. Ass't Surgeon W. C. Minor, Third Division Hospital, Alexandria, Va.*

CASE 37.—Private General Denning, Co. G, 12th Tenn. Cav.; age 18; was admitted March 25, 1864, with continued fever, and died April 3 of erysipelas. *Post-mortem* examination: The bronchial tubes of both sides were inflamed. The heart weighed eleven ounces and a half; the endocardium was discolored. The liver weighed seventy ounces; the spleen sixteen; the kidneys five and a half each. The intestines were healthy.—*Hospital No. 1, Nashville, Tenn.*

CASE 38.—Private Charles A. Rowell, Co. M, 1st Vt. Heavy Art'y, was admitted April 24, 1865, with erysipelas, and died on the 28th. *Post-mortem* examination: The thoracic viscera were normal but for extensive adhesions of the right pleura. The spleen was much enlarged; the other abdominal viscera healthy.—*Depot Field Hospital, Sixth Army Corps, City Point, Va.*

CASE 39.—Private James M. Brown, Co. H, 11th N. H.; age 18; was admitted March 26, 1864, with erysipelas, and died April 3. *Post-mortem* examination: The mass of the left lung was healthy, but there were some superficial abscesses, one of which adhered to the thoracic wall; the bronchial tubes were slightly inflamed. The heart and the abdominal organs appeared healthy.—*Hospital No. 1, Nashville, Tenn.*

CASE 40.—Private Thomas Sarfas, Co. E, 19th V. R. Corps, was admitted June 8, 1864, with erysipelas of both wrists. Tincture of iodine was applied and citrate of iron and quinine, whiskey and beef-tea prescribed. On the 11th the face was attacked, the scalp becoming speedily involved. On the 13th the tongue was dry and brown. Coma supervened and the body became covered with a dark-blue petechial eruption which rapidly filled with sero-purulent matter. Death occurred next day. *Post-mortem* examination: The lungs, liver, kidneys and arch of the aorta were filled with small abscesses resembling those on the skin. [See *Specimen* 323, Med. Sect., Army Medical Museum.]—*Sherburn Barracks, Washington, D. C.*

Surgeon S. YORK, *54th Ill., Jackson, Tenn., April* 30, 1863.—In one of the cases which terminated fatally the disease attacked the throat to a limited extent over the parotid and submaxillary glands. The skin was not extensively affected, but the face soon became considerably swollen. The patient died in a few hours, after a short difficulty of breathing, from œdema of the glottis; the epiglottis was about half an inch in thickness and the entrance into the larynx nearly closed. In the other fatal case the eruption made its appearance between the cheek bones and the nose, extended over a small surface only, and after a duration of two days became suddenly translated to the liver, stomach and diaphragm. The patient had severe pain in the right hypochondrium and epigastrium, bilious vomiting and singultus. He died in about six days thereafter with plain indications of gangrene of the organs involved. In this case no *post-mortem* examination was held.

I have used in the treatment of this disease saline purgatives in cases where there was biliary derangement, mercurials as indicated, and emetics of ipecacuanha in those attended with gastric disorder; chlorate of potash, tincture of iron, quinine, iodide of potassium and wine, whiskey or brandy have also been given. The best diet after

the acute stage had subsided somewhat was found to be soft-boiled eggs, beef-tea and good wheaten bread. The local remedies in which I have placed most confidence are tincture of iodine, acetate of lead and vinegar. In one case of phlegmonous erysipelas, in which the head was greatly swollen, I applied a lemon poultice apparently with benefit. This was suggested by the virtues ascribed by some writers to the cranberry poultice. I supposed the virtues of the latter to be due to its acidity, and as the berries could not be obtained I tried the lemon.

Surgeon W. H. WHITE, *22d Iowa, near West Plains, Mo., Feb.* 1, 1863.—The disease which gave us most anxiety was erysipelas. The face was chiefly attacked. Most of the cases were severe and associated with marked derangement of the liver and digestive organs. They generally yielded to active cathartics in conjunction with tonics and local applications of nitrate of silver or tincture of iodine.

Surgeon J. COOPER MCKEE, *U. S. A., Camp Butler, near Springfield, Ill., July* 1, 1862.—I can speak with the highest satisfaction of the use of muriated tincture of iron in the treatment of erysipelas. Alternated with quinine it controlled the disease in all its forms. I found local applications, as of iodine and nitrate of silver, unsatisfactory in their results; as they failed to limit the spread of the disease I abandoned their use and applied emulsions of flaxseed, thereby relieving my patients from much unnecessary suffering.

Extract from the Records of the Chimborazo Hospital, Richmond, Va.—Erysipelatous cases have occurred within the last month [March, 1864], none grave. They are treated with iodine or muriated tincture of iron topically, and the latter internally with saline purgatives as required. In the case of Hicks, who entered March 5, this treatment was changed on the 9th for the sulphate of iron, there being no iodine in the pharmacy. At this time the erysipelas was leaving the hands of the patient and invading the upper arms. Velpeau says that sulphate of iron arrests the malady sooner by two days than any other agent. His formula for the lotion was employed. It arrested the disease in thirty hours. At the same time the patient took quinine three times daily. On the 12th he was convalescent.

TREATMENT.—The essentials to success in the management of erysipelas comprised the prompt isolation of the affected individual, the dissipation of causative miasms by free ventilation and the disinfection or cremation of articles known or suspected to be dangerous. The gradual establishment of special wards and hospitals for erysipelatous cases during the progress of the war gave a practical recognition to the contagious qualities of the disease and to the other intimate analogies which classed it for prevention and treatment among the eruptive fevers. This view held good, however, only in hospital practice. Erysipelas occurred in the field independent of the infection of a pre-existing case. Sometimes it appeared due to atmospheric exposures; sometimes no apparent cause could be assigned for its development. Here it presented no analogy to the eruptive fever save in its course in the individual,—a self-limited febrile action with an associated inflammatory condition of the skin, and frequently of the internal surfaces, constituting the cerebral, tonsillar, laryngeal, pulmonary or dysenteric complications of the disease. There was no inherent susceptibility which, until exhausted by an attack of the malady, made victims of those subjected to contact with the affected individual. There was, therefore, no apparent communicability. But when this same case was transferred to the crowded ward of a general hospital a distinctly contagious quality was manifested. Defective ventilation seemed to concentrate the causative exhalations to a degree of virulence that overwhelmed the conservative powers of those exposed to their influence,—or the inmates, as a result of previous disease, had these powers so weakened as practically to have developed susceptibility to attack. Probably both of these conditions were concerned in the spread of the disease. Overcrowding was generally regarded as a predisposing factor, and the susceptibility of enfeebled convalescents was shown by the experience of every hospital.

Bromine vapor in quantity sufficient to be perceptible in the atmosphere of the wards was used in some of the western hospitals for the prevention of erysipelas. Surgeon M. GOLDSMITH, U. S. Vols., published directions for the use of this agent,* with a communication from Dr. B. WOODWARD, in which it is stated that since the use of the vapor in the crowded wards of the Park Barracks Hospital, Louisville, Ky., not a single case had occurred, although prior to its use from five to eight cases had been developed every week. In wards

* *American Medical Times*, VI, New York, 1863, p. 141.

containing as many as sixteen cases at a time, side by side with other sick and wounded men, the disease did not spread after the use of this disinfectant, and nurses who formerly dreaded the danger of having erysipelas in their wards lost all fear of the disease.*

Clinically, treatment was directed to the constitutional state of the individual to moderate the violence of the local inflammation, limit its spread and control its results. When the constitutional disturbance was of a sthenic character salines, laxatives and diaphoretics were administered; but these were seldom continued for any length of time, as the disease, if mild, speedily subsided, and if severe, as speedily induced a state of prostration which called for careful nursing, support and stimulation. Emetics were rarely used at the commencement of the attack; laxatives or purgatives were, on the contrary, freely prescribed, particularly in the presence of cerebral symptoms. Dr. DAY has, however, entered a protest against the use of the latter on the ground of their liability to induce prostration and increase the tendency to diarrhœal complications; he claimed that constipation was a favorable condition in the erysipelas cases of Hospital No. 10, Nashville, Tenn. Tincture of iron appears to have been regarded in the light of a specific: In most cases, as soon as the inflammatory blush indicated the nature of the attack, this remedy was administered, many medical officers considering that it controlled the disease and others acknowledging benefit from its use but doubting whether the duration of the attack was in any case shortened. Chlorate of potash was also largely used by some practitioners. As soon, however, as the pulse became weak, the delirium muttering or the general prostration notable, beef-essence, milk and eggs, with wine, whiskey or brandy were freely administered. Convalescence was promoted by quinine, iron and extra articles of diet, and to these stimulants were added during the tedious progress of consecutive suppurations.

Local treatment was rational or empiric. The aim of the one was to relieve suffering and allay local inflammation,—of the other to exercise a controlling influence on the cutaneous manifestations. The feelings of the patient invariably testified to the efficacy of soothing methods, seldom to that of the empiric measures, the repute of which was sustained chiefly by the favorable dictum of the medical men who applied them. Protection from the air afforded relief. This was best effected by smearing the surface with oil, fresh lard, glycerine or some unirritating unguent. Dusting the parts with flour or lightly covering them with cotton answered the purpose at first; but these substances generally became a source of irritation afterwards by forming incrustations with the exudations from the affected surfaces. Lead and other cooling lotions proved of value in many cases. Flaxseed emulsion and glycerole of starch were also regarded as useful. Collodion had its advocates as forming a light protective and equably constringent film.

The empiric methods consisted of the application of tincture of iodine or nitrate of silver to the inflamed surface with the view of favorably influencing the local action. Occasionally the attempt was made to limit the spread of the inflammation by circumscribing it with an application of one or other of these agents to a strip or band of the sound adjacent skin. The tincture of iron and solutions of the sulphate or persulphate of this metal were also employed on the affected surface to subdue the violence and arrest the progress of the inflammatory action. The repute of the cranberry poultice was such that one medical officer, in the absence of this acid fruit, made use of lemons, and in his opinion with benefit to his patients. A saturated solution of chlorate of potash was sometimes used as a wash to the

*Journal last cited, p. 239.

surface by medical men who prescribed this salt for internal administration. Unguents of resin and turpentine appear to have been used extensively in the erysipelas wards of the prison hospital at Rock Island, Ill.

Abscesses, diffuse suppurations and other local results of the acute inflammation were treated in accordance with the general principles of surgery.

CHAPTER VII.—OTHER MIASMATIC DISEASES.

I.—MUMPS.

This disease occurred to a notable extent, particularly in the first year of the war, when 40 cases were reported among every thousand men. The rate of prevalence fell to 23 in the second and third years, to 14 in the fourth year and to less than 3 per thousand of strength in the fifth year. Suppurative inflammation of the parotid glands was not unusual in the advanced stages of the continued fevers,* but the tumefaction of the glands, reported under the present heading, generally subsided at the end of a few days. Of 48,128 cases reported 72 died. The following case probably illustrates the character of those having a fatal termination:

Sergeant Joseph B. Brown, Co. E, 3d Ky.; age 26; was admitted March 21, 1863, with slight diarrhœa and pain, redness, heat and swelling in the region of the parotid. A poultice of arnica leaves and flaxseed was applied, and in a day or two the abscess communicated with the external auditory canal. On the 27th a free incision gave exit to six ounces of pus. On April 2 he was restless, but became quiet after the administration of hyoscyamus and opium. He was found dead in bed on the morning of the 3d. *Post-mortem* examination: The mastoid portion of the temporal bone was denuded and carious and its cells filled with pus. The deep vessels and nerves were completely dissected by the progress of the suppuration. The right ventricle of the heart contained a fibrinous clot. The left lung, its apex especially, was studded with miliary tubercle. The liver was large but healthy; the gall-bladder full; the bowels filled with flatus.—*Lawson Hospital, St. Louis, Mo.*

II.—YELLOW FEVER.

Our armies fortunately escaped visitation from epidemics of exotic origin. Cholera did not invade the country until after the war period. Yellow fever was imported, but by timely conservative action most of the troops in the invaded or threatened departments were preserved from the disease. The regiments stationed in the Department of the Gulf wholly escaped.

The freedom of New Orleans from visitation while garrisoned by unacclimated men from the North has been ascribed to the institution of active measures of local sanitation and the strict enforcement of quarantine regulations by General Butler's military government. The following remarks by Surgeon T. H. Bache, U. S. Vols., who was Medical Director during the first summer our troops spent in the city, bears on this point:

Was the exemption from yellow fever due to quarantine or to the cleanly condition of the city, or to both? Following La Roche and others I was not originally in favor of establishing a quarantine to keep out yellow fever. By originally I mean prior to the summer of 1862. My views were changing about that time, chiefly on account of the exemption of New Orleans from the disease during the summer of 1861. This I was inclined to attribute to our blockade, which was the strictest sort of a quarantine. During that summer the city was as dirty, if not dirtier than usual, owing to the war; the ditches for artificial drainage were obstructed on our arrival. Moreover the epidemic was "over due," as they say. I relinquished the position of Medical Director on August 15, 1862. About the 5th or

* *Supra*, page 434.

6th of September a man, who arrived on a vessel which had passed quarantine a day or two before, sickened and died of black vomit on the fifth day of the disease. I never heard, however, of any other case following it.

The quarantine established during the summer of 1862 was kept up with unremitting care during the following season, with the effect of excluding the fever from the city, although many cases were treated at the quarantine station. Ass't Surgeon GEORGE M. STERNBERG, U. S. Army, says on this subject:

On the fourth of July, 1863, the Spanish man-of-war Pizarro arrived at quarantine, and the vigilant resident physician in his examination discovered cases of yellow fever on board of her. Every effort was made by the commander of the vessel and the Spanish Consul at New Orleans to obtain permission for the vessel to come to the city; but they were assured that it would be allowed to come no further until at least thirty days had elapsed after the last case of yellow fever had occurred and the vessel was thoroughly fumigated. The Pizarro therefore put to sea again with yellow fever still on board, after having remained at the station three weeks. There were fifteen cases landed from this vessel and treated in the hospital at the station; of these three died. About October 5 cases of yellow fever occurred on some vessels of our navy which had recently communicated with infected vessels at Pensacola and off Mobile. The fact that the disease was then prevailing in the blockading squadron was not known at this time to the authorities in New Orleans, and the first intimation of it was received when it made its appearance in the Holyhock, which was then lying in front of the city. The vessel was at once sent to quarantine. When she arrived there were three dead bodies on board; and four afterwards died out of twelve cases. The disease soon after made its appearance in the Fear-not, the Pensacola and the Estrella, all of which were sent to quarantine. Fortunately it was so late in the season that it did not spread any further in the navy and not at all in the city. The last case occurred late in October on the Estrella.

The Department of the South was visited in the autumn of 1862 and again in 1864, when also some of the stations in the Department of North Carolina became infected. On the first occasion 382 cases were recorded with 100 deaths; on the second 783 cases with 309 deaths among the white and 190 cases with 27 deaths among the colored troops.

On June 20, 1862, the bark Adventure, three days from Havana, Cuba, put into Key West, Fla., in distress. She was quarantined for ten days and lay at the station for three days longer than the official term. About this time four of her crew, sick with fever, were taken into the Marine hospital, where one died and the others recovered. On July 27 a soldier of the 90th N. Y. was attacked, and the disease afterwards spread through the garrison, which consisted of 448 men, yielding 2 cases in July, 153 in August, 137 in September and 39 in October, or a total of 331 cases, 71 of which proved fatal. It is thus seen that this garrison furnished 87 per cent. of the cases and 71 per cent. of the mortality occasioned by yellow fever during the year 1862.

Surgeon E. S. HOFFMAN, 90th N. Y., in an able report of his experiences at this time, states that yellow fever in Key West has always been traced to direct importation from Cuba. Ass't Surgeon CORNICK, U. S. Army, denies this and suggests a local origin. However this may be, the weather in 1861 was similar to that prevailing in 1862, and in both years the island contained a large number of unacclimated men, but in the latter only did the disease appear. Some local conditions no doubt favored its spread and added to its virulence, such as a large amount of decaying vegetation resulting from the clearing of land for military purposes, the breaking of ground for gardens, the excavations involved in the construction of fortifications, and during the progress of the last, the opening and removal of about three hundred graves which is said to have occasioned an intolerable odor. The clinical features of the disease are thus depicted:

Premonitory symptoms for the most part were wanting throughout the epidemic. In a few cases the patient complained for some days of slight headache and constipation, with trifling pains in the back and loins. In two cases diarrhœa was followed on the second or third day by the sudden appearance of black vomit and a similar black matter in the stools. Death by coma took place soon after; but both these men had been weakened by typhoid fever, from which they were convalescing at the time of their fatal seizure. A similar case, remarkable from its bearing on the question of fright and nervousness, was that of Private George Cornwall of Co. I, who was admitted August 21 with diarrhœa of five or six stools daily. He had no fever nor headache. Appropriate medicines relieved the diarrhœa, and the patient was preparing to leave the hospital on the third day when a soldier was brought in with fully-developed yellow fever. The complaints and evident alarm of the latter frightened Cornwall, and within one hour of the admission of the new patient he was himself seized with violent fever, headache, intense injection of the conjunctivæ and distressing pain in the back and lower extremities. Next morning suppression of urine came on, soon followed by vomiting,—the fluid at first watery afterward showed the coffee-ground sediment,—and a strong

urinous odor was perceptible in the perspiration. The other case now improving, Cornwall's spirits rose, hope returned to him, and for six days he struggled unavailingly against the disease.

Nearly every case presented a different series of symptoms, influenced by the constitution, temperament and idiosyncracy of the patient. In opposition to observations made in most other epidemics of this disease there was no particular time during the twenty-four hours when the attack occurred, the patient being seized at all hours both of day and night. In most the onset was sudden. The patient was seized with a severe pain in the head, generally supra-orbital, and often preceded by a regular chill. The pain soon extended to the back of the neck, the lumbar region, the knees and calves of the legs, and with this were associated intolerance of light and deep-seated pain in the eyeballs. In a few cases the head symptoms reached a high degree at once, delirium setting in almost from the first, but I found that these yielded more readily to prompt measures than where meningitis manifested itself at a later period. The eyes were injected and watery; the skin generally hot and dry, but sometimes, particularly in fatal cases, cold and covered with clammy perspiration. The pulse varied from 85 to 100 and was full and incompressible save in the cases of cold skin, where it was small and gaseous. The tongue was usually covered with white fur, its tip and edges red; but sometimes it was perfectly clean, with or without the red tip; the edges and tip corresponded exactly with the pulse and febrile excitement—the higher the fever the redder the tip and edges. Only in two cases was there a dry tongue and in but one a brown or dirty coat. The bowels were generally constipated—sometimes difficult to move, but usually readily affected by cathartics. In many cases after the administration of calomel the patients continued to have inky and frequent stools for some days. The urine was mostly normal at the onset, but in severe cases scanty, and the little that passed was dark-colored and threw down a copious sediment. Nausea frequently was present at first and the stomach easily rejected its undigested contents,—sometimes accompanied by bilious matter.

These symptoms continued for a longer or shorter period. Sometimes the fever lasted from twelve to forty-eight hours, and in a few fatal cases to seventy-two hours. During the fever the headache, pain in the back, legs and eyes, with unsatiable thirst, were the most distressing symptoms. Generally, after treatment, perspiration was speedily established and continued through the fever; but in some all available and known means failed to induce moisture on the hot, dry surface. In a few cases there were distinct remissions, and in five patients who had passed through the second stage and were convalescent the fever returned on the ninth day and the whole programme was repeated as if an original attack.

At the beginning of the second stage the patient was free from headache and pain, but still complained of weakness in the back. The stomach, mostly irritable, often rejected its contents without effort, while in some there was constant retching without emesis. Pain, more or less acute, according to the severity of the attack, with tenderness on pressure, was manifested in the epigastrium. Patients apparently convalescent and desirous of getting up would show great uneasiness on pressure at this point, and before long black vomit revealed to them the desperate nature of the disease and its treacherous character. As a rule the worst symptoms came on after the patient had been from six to twelve hours in the second stage. The pain in the epigastrium increased and burning thirst accompanied it; vomiting followed, at first of the fluids ingested, often clear and transparent, but sometimes mixed with chyle or more or less colored with bile; in three or four hours the fluid assumed the appearance of water, with a brownish-black sediment. On closer examination this black matter was found to be in ropy feculent masses, some of lighter specific gravity, suspended in the fluid, others sinking to the bottom and adhering with considerable tenacity to the containing vessel. The quantity of liquid ejected was sometimes very great, and the stomach relieved itself in some cases by, as it were, involuntary muscular action, casting the vomit to a distance of several feet by a single spasmodic act. The matter thrown up resembled chocolate, and on settling deposited a grumous coffee-ground-like mass, which, when expressed through filtering paper, lost much of its dark color. It effervesced with bicarbonate of potash and turned blue litmus paper red. Heated in a test-tube the fluid, if previously transparent, became opaque and curdy like albuminous urine. In those cases in which uræmia was present the vomit when heated gave off ammonia, as shown by the white fumes that were developed when a rod that had been dipped in muriatic acid was held over it. The urine was invariably albuminous and sometimes largely mixed with blood. I observed as one of the characteristics of the epidemic that the matter was not ejected in large quantities at a time from the stomach; and only in a few cases did the quantity thrown up at once exceed two quarts. In these it was very dark, resembling a mixture of soap and water, very acid, and accompanied by a sensation of rawness and extreme distress in the epigastrium; hiccough also troubled the patient considerably during the intervals. The matter, from its acrimonious nature, frequently excoriated the tongue, throat and lips; the stools also, being often of a similar character, caused painful sensations in their passage. The period from the beginning of the black vomit until its termination in convalescence or death was variable—sometimes it terminated fatally in twenty-four hours; sometimes it lasted longer, and in one case was even protracted for four days, ending in recovery. I always considered its appearance a very grave symptom, although twelve well-marked cases recovered out of fifty-two that presented it. During this stage of the fever the pulse was generally from 50 to 65, small and easily compressible, but in two fatal cases it reached 100 per minute. The bowels became loose, particularly if they had been constipated in the first stage; the fæces of a dark color and fetid odor. The color of the skin varied considerably—in some natural, in others presenting various shades of yellow, but generally this color did not make its appearance until shortly before the closing scene. In two cases, which afterwards recovered, I observed previous to convalescence a distinct third stage of the fever. The matter thrown up changed its color—in place of a tarry appearance it became streaked with blood; the tongue cracked and blood began to flow from it and from the gums, lips and nose; blood appeared in the stools also, and the yellow color of the skin passed into a dark-orange color. The hæmatemesis in one case was checked with tincture of iron every two hours, and in the other the persulphate had an excellent effect. The ten remaining cases of black vomit convalesced

rapidly on the subsidence of the vomiting, and resumed their duties sooner than others who, from a severe attack of yellow fever, passed from the first stage to convalescence without going through a second and third stage. Fatal cases died generally on the second or third day. One case died three weeks after being attacked with the fever. He passed through all the stages,—the hot stage lasting forty-eight hours, the second with evident signs of the coffee-ground vomit, the third with hæmaturia, hæmatemesis and bleeding from the tongue and lungs, after which he fell into a typhoid condition, which ended in death.

Recovery was rapid. Ten days after the onset the patients resumed their duties.

The treatment adopted in this epidemic is described by Ass't Surg. W. F. CORNICK, U. S. A., as follows:

As soon as the patient is attacked with symptoms of the fever he is placed to his chin in a hot bath containing from four to eight ounces of mustard until he gets into a profuse perspiration or complains of being faint; he is then put in bed between blankets and fifteen to twenty grains of calomel are administered, followed in four hours by an ounce or two of castor oil. By the time the oil has had a good effect his pulse as a rule becomes almost natural, though in many cases quite frequent. I then give him ten grains of quinine every hour until he has taken two doses, after which five grains every two hours until he complains of ringing in his ears or other indications of the action of the remedy. I also give sweet spirit of nitre to keep the kidneys in good working order, from the derangement of which we have so much to fear. Should the patient after this complain of gastric uneasiness I give, as a preventive of black vomit, one drop of creasote in the form of a pill; this has been attended with the happiest results, sometimes even after black vomit has made its appearance. If the patient complain of much uneasiness about the stomach I generally resort to sinapisms, which will in most instances give relief. After this he is treated upon general principles.

The other points affected during the year 1862 were Hilton Head, S. C., and Fort Jefferson, Fla., both of which received the disease from Key West. Surgeon C. H. CRANE, U. S. A., Medical Director of the Department, placed on record the facts connected with its appearance at the first-mentioned station.*

The steamer Delaware, with General Terry and staff on board, left this place [Hilton Head] July 26 for St. Augustine, Key West and Fort Jefferson. She returned August 26, bringing a detachment of the 7th N. H. that had been left sick at Fort Jefferson when the regiment was relieved from that post in June last. These men had all been invalids for a long time and were broken down in constitution.

This steamer left Key West on her return trip August 14, and on her arrival here was sent to quarantine at St. Helena, about thirty miles distant. Among the passengers was Ass't Surgeon CORNICK, U. S. A., who had been on duty at Key West for some time and much exposed to yellow fever. Shortly after embarking this officer was taken with what he supposed to be a mild attack of the fever; but he had completely recovered before the arrival of the steamer at this place, and no case of sickness then existed on board. The vessel remained at the quarantine station twelve days, when, as Surgeon DALTON, U. S. Vols., who was a passenger, reported to me that there was no sickness on board, she was allowed to come to Hilton Head. Three days subsequent to the landing of the passengers yellow fever appeared among the New Hampshire men, and to date (September 19) there have been eight deaths in the detachment; but the disease has not spread beyond it, and during the past three days there has been no new case. As the remainder of the detachment has been sent to New York in the Delaware I am hopeful that no more cases will occur. The other chartered vessels with Government supplies aboard, which have arrived here from Key West, have also been sent to New York. I am satisfied that the only sure method of excluding yellow fever from this place is to stop all communication with infected ports. In the instance of the Delaware twenty-eight days elapsed between the time the vessel left Key West, the only infected port she visited, and the development of the disease after the debarkation of her passengers at this place.

At this time there were about ten thousand troops at Hilton Head and Beaufort, but the disease did not spread among them, although some cases occurred in October and November in the vicinity of the wharf at which the Delaware had landed her passengers. In all, including the men of the 7th N. H., there were forty cases at Hilton Head, twenty-five of which were fatal.

During October eleven cases with four deaths were reported from Fort Jefferson, Fla., garrisoned by a detachment of the 90th N. Y., the main body of which was then suffering from the disease at Key West. Ass't Surgeon CHAPMAN, of that regiment, denied the importation of the fever, as a quarantine of seven to fourteen days had been imposed on all vessels from infected ports. It is needless to advert to the weakness of this argument in

* See also *Yellow Fever at Port Royal, S. C.*, by THOMAS T. SMILEY, U. S. Hospital, Hilton Head, S. C.—*Boston Med. and Surg. Jour.*, LXVII, 1863, p. 449.

favor of the domestic origin of yellow fever. The cases of the Adventure and Delaware are sufficient to prove its fallacy.

The reports of Surgeon P. W. HAND, U. S. Vols., state that during this autumn the disease affected the citizens of Wilmington, N. C., and Charleston, S. C., attributing its introduction in both instances to blockade runners from infected ports. The evidence appears to throw the responsibility of the Wilmington epidemic, which is reported to have occasioned 1,200 deaths among the 3,000 whites and negroes who remained in the city, on an infected steamer from Nassau, which ran the blockade on August 6.

The epidemics of 1864 affected the garrisons of Key West, Fla., and New Berne, N. C. From the first-mentioned station 152 cases with 12 deaths were reported as having occurred among the 2d U. S. Colored Troops in May and June, and 78 cases with 21 deaths among white troops in July and August; but no particulars of their origin were furnished by the medical officer in charge. The fever appeared at New Berne about the beginning of September and continued until the frosts of November. During this period 705 cases with 288 deaths were reported among the white, and 58 cases with 13 deaths among the colored troops. Eight medical officers, out of sixteen affected, fell victims to the disease. The origin of this epidemic is involved in obscurity. The first cases among the troops occurred in the persons of men attached to District Headquarters as clerks and orderlies. It is known, however, that two citizens were taken sick on the same date as the earliest of the cases among the troops; and it is impossible to say how many cases, unobserved and unreported, may have occurred among the civil population at an earlier period. It does not appear that the infection was introduced from a foreign port, nor by refugees from Wilmington, for the disease did not affect the citizens of the latter place until some time after its appearance at New Berne; but as the fever was at this time prevailing in Charleston, S. C., the infection may have been carried northward by refugees from that afflicted city. Surgeon HAND, who investigated the outbreak, was so impressed with the difficulties besetting the proof of importation that he referred the disease to local causes, and enumerated in his report the various unfavorable hygienic influences which in his view contributed to its production. It is needless to say that the history of yellow-fever epidemics in the South since the close of the war does not sustain the theory of their local origin.

When the presence of the disease was recognized at New Berne soldiers and citizens were at once moved to Morehead City, Beaufort, Hatteras, Roanoke Island or other places. Certain individuals who had become infected prior to their departure with these detachments suffered from an attack at their new stations, but the disease did not spread, except to a limited extent at Beaufort.

Surgeon C. A. COWGILL, U. S. Vols., reported that 292 cases of fever were admitted into the Foster hospital at New Berne during the progress of the epidemic, and that some time after the first cases were received the disease spread through the wards, affecting first convalescents from malarial diseases, then convalescents from other diseases, and finally the attendants; of these 118 were attacked, giving a total of 410 cases and 181 deaths among the white troops in the establishment.

Surgeon P. W. HAND, U. S. Vols., reported of this epidemic as follows:

> New Berne is situated on a point of low land at the junction of the Trent and Neuse rivers and is almost wholly surrounded by marsh and swamps. The highest part of the town is only a few feet above the surface of the river, and the streets, being without paving, have an imperfect drainage and in wet weather are a mass of mud. The elms and maple trees, which in times past have been planted in every yard and street without regard to taste or utility,

have grown into a perfect forest, and during the wet days of July last the dense foliage kept the whole town damp and mouldy; during that month there were few days without a shower of rain. In the spring and summer laborers were kept at work on the streets and sewers, and Government teams were sent regularly to remove such filth and garbage as might be collected, the citizens being required by the commanding officer to deposit all such refuse where the teams could get it. The backyards were not, however, very closely examined, and the accumulations of years were afterwards found in many places; but with all this, I believe the general sanitary condition of New Berne when the fever broke out to have been better than that of most Southern towns.

During the winter of 1863–64 and spring of 1864 several small docks, near the foot of Union street on the Neuse river and Craven street on the Trent, were filled up, in part, it is said, with stable manure, for the purpose of extending the wharves. Between two of these docks thus filled up at the foot of Craven street was a row of old frame buildings, several of which were built on piles, with the river-water formerly washing under them. Through carelessness or neglect no drainage was provided for the cavern under these buildings. In consequence the summer rains made a pond under them, where dead rats and filth rapidly accumulated and where the intense heat of August generated fearful poison.

On the Neuse river front there was built in July and August an embankment to prevent the water encroaching on the carriage-way between Pollock and Short streets. This was made of a solid wood front, filled in for the most part with clean sand; but during several days of excessively low water, sand and mud were thrown into it from the exposed river bottom.

During July and August the weather remained steadily hot, the thermometer averaging at midday 83.25° in July and 85° in August. The fall of rain in July was 9 inches and in August 4.5 inches. The prevailing winds during both months were from the southwest. The continual showers of rain during these months and September kept the ground and air very moist without mitigating the heat. In July we had several thunder storms with heavy winds, but in August the wind was steadily from the southwest or south and very light.

There is no regular ebb and flow of the tide in the Neuse river, but these continual southwest winds drove the water out and we had for many days the lowest tides that had been known for years. Many acres of sand and mud on both river fronts were thus exposed to the hot sun. In the summer and fall the vicinity of New Berne is always prolific of malarial fevers, and the warm season of 1864 was one of the worst known not only here but in all parts of North Carolina. Each year since the occupation of New Berne it has been noticed that the regiment doing provost duty, and remaining in town, has been almost exempt from intermittent and remittent fevers and much more healthy than the troops encamped on the outskirts. It was noticed through the past August that the men in town—part of the 15th Conn.—were generally escaping the malarial fever, but early in September some bad cases of congestive fever occurred among them.

On the 6th of this month yellow fever existed in New Berne, although not then acknowledged or positively recognized, and this disease undoubtedly *originated* in the town.

The Neuse being blockaded we are sure no vessel arrived at New Berne from an infected port at any time during the summer. A few refugees came in during August, but none of them brought more than the clothing they could carry themselves, and we can find none who came in about that time from Wilmington. No sailors or soldiers were landed at Morehead City and thence transferred to New Berne from any Southern port. On August 25 thirty-four men arrived at Morehead City in the steamer New Berne from the receiving ship North Carolina at Brooklyn Navy Yard, and were forwarded by rail to New Berne for vessels in the sounds. No disease existed among them, and this was the only shipment of sailors through New Berne between August 15 and Sept. 10, 1864.

The first cases of the disease which came under my notice, and, so far as we can learn, the initial ones, were—

Private Orlando Pollock, 3d N. Y. Art'y, clerk at district headquarters, corner Union and East Front streets. Admitted to Foster hospital Sept. 2,—died on the 6th.

Private Francis Coates, 3d N. Y. Cav., orderly at district headquarters. Admitted Sept. 1,—died on the 6th.

Private G. C. Lillie, U. S. Signal Corps. Admitted Sept. 4 from signal office on opposite corner from district headquarters,—died on the 6th.

Mrs. Wilcox, a white refugee, corner of George and South Front streets; had chills for a month or more; taken quite sick Sept. 1; had black vomit, turned yellow, and died on the 7th. This woman had lived in that house one month and in New Berne eight months.

Mrs. Prudence Rice, whom I did not see, died Sept. 6, in the next house to Mrs. Wilcox, of what was probably yellow fever.

Sergeant M. Rogers, 15th Conn., jailor at Confederate prison, corner George and Pollock streets, was taken sick and admitted to regimental hospital on Sept. 7; had black vomit, and died on the 9th.

These occurred at two points widely separated, and preceded by nearly a week the irruption of the great epidemic. I could not at the time believe they were genuine cases of yellow fever; but on September 12 Lieut. A. B. Johnson, street inspector, and two soldiers, died in the Foster hospital with unmistakable symptoms of that disease. From this time cases began rapidly to appear in different parts of the town near the two rivers; but it was soon found that the worst cases were among the Government employés in the vicinity of Craven street wharf. This led to an examination, and on tearing up the floors of some of the old buildings used as storehouses by the quartermaster and commissary, a pool of stagnant water was found the effluvium from which sickened the workmen. It was at once decided to burn down the houses and fill up the pond. This was done, but the poison generated there no doubt existed many weeks after.

The epidemic influence seemed to prevail with greatest force in the vicinity of the water, and for several weeks was confined to a district two squares broad along each river bank. It was most violent in the rotten old frame

houses which, on several streets, are built immediately on the ground and which are always damp; but every house in the infected district had more or less of the disease. Gradually the epidemic influence spread over most of the town, and by November 1 almost every white person in the place had suffered. The negroes were at first exempt; but after a few weeks the disease extended to them and nearly all in New Berne had it, generally, however, in a comparatively mild form. The epidemic prevailed violently for only forty-five days, but cases occurred from September 2 to November 22. Between these dates eight hundred and sixty whites and one hundred and fifty-five negroes died in New Berne from yellow fever. Children nearly all recovered, while with the aged and persons recently arrived from the North it was very fatal.

During this epidemic it was clearly proved that no contagion existed. Soldiers from the Foster hospital and provost guard, as well as citizens, were sent away as rapidly as possible to Morehead City, Beaufort, Hatteras, Roanoke Island, Bachelor's Creek and to the country about here, where many of them soon after sickened and died; but at no place except Beaufort did the disease extend to any other persons. At Morehead City patients removed from New Berne were placed indiscriminately in the wards of the Mansfield hospital, and citizens of New Berne thronged the hotel. Twenty-one soldiers and thirty-four citizens died of yellow fever; yet not a single person contracted the disease unless he had visited New Berne or Beaufort. At other points similar observations were made. Cases have been reported as occurring in the country about here conflicting with this idea, but I have been able to trace every one of them to a visit, often very short, to New Berne. The town of Beaufort was badly crowded with refugees from Plymouth and Little Washington, and the policing was not good. The proper atmosphere for the spread of the epidemic was found there, and from a few cases brought from New Berne the disease spread to a considerable extent over the more crowded portion of the town. Fifteen soldiers and seventy-six citizens died there; but it should be noted that at the Beaufort hospital, which is pushed out on the sea-face of the town, not a single case of the fever occurred among patients or attendants who had not been exposed elsewhere.

The patients were generally taken in the evening with a slight chill, followed in a short time by fever and severe pain in the sacral and lower part of the lumbar region. It was rare to have severe neuralgic pains, but the patients were always restless and sleepless. Pain in the head was almost universal but not severe; it was generally over the eyes, sometimes much worse on one side than on the other, and with a feeling of fulness and deep-seated pain in the eyeballs. The conjunctiva was always more or less injected and often very red, with a yellow hue of the sclerotic coat appearing through it and extending back over the eyeball. The face was not much flushed; but the skin felt hot to the touch or else quite cool, the circulation being bad even in the early stage. Profuse sweating often continued for hours, the pulse remaining unaltered, from 104 to 120 as a rule, with a quick beat and often giving the impression of air being in the artery; it sometimes had a thrill like an aneurism. The tongue was clean and its character varied at different periods of the epidemic. During the first two weeks it was generally of natural size, with a slight white fur in the middle and red tip and edges. Afterwards in almost every case it acquired a dull leaden hue with no other unusual appearance. In only a few cases did we have the large "oyster tongue." The stomach was irritable and tender on pressure from the beginning; the bowels constipated or regular, with no soreness or diarrhœa.

This first or febrile stage lasted from twenty-four to eighty hours, generally about sixty hours, and was followed by a decided remission, the patient being left greatly prostrated but free from pain and often feeling that all danger was past. In the second stage the circulation was feeble and the greatest care had to be taken to preserve an even temperature. Mosquito bites at this time left purple, purpura-like spots, and the cuticle was harsh and dry. The pulse became quite slow, often going down as low as 66–70 and easily compressed under the finger. The irritability of the stomach now often subsided and the tongue would get a slight coating of whitish fur or would swell considerably. In this condition the patient would remain from twelve to twenty-four hours cheerful and confident. The third stage then coming on our patients would be found with great restlessness, an anxious, often frightened expression of countenance, increased irritability of stomach, with a feeling of uneasiness or oppression at the pericardium and a tendency to belch or bring up wind from the stomach,—a deepening of the yellow in the eyes and a brownish-yellow tinge of the whole skin. An offensive odor was at this time often exhaled from the body, and frequently there was suppression of urine. This condition was often followed by black vomit and death, the fatal termination being generally on the fifth day—sometimes as early as the third, rarely later than the eighth.

Fortunately, however, many cases did not terminate in death. The symptoms above related gradually subsided, and decided convalescence was established by the seventh or eighth day. A few recovered after having had black vomit; but such cases were rare. No one was known to recover after having entire suppression of urine. Retention occurred in only a few instances—in very nervous persons. Death was sometimes preceded by stupor with stertorous breathing; but oftener by great nervous irritability, with slight spasms, opisthotonos and jactitation. Secondary fever was not observed in many instances. It was found to be not unfavorable when it did occur. Convalescence was slow, and the yellow tinge of the skin and eyes did not disappear until the third or fourth week.

At the beginning of the epidemic we believed the disease to be of malarial origin and treated it with quinine; but our cases died. The disease was one evidently of blood poisoning. Quinine would not check its action on the brain; the indications were therefore to eliminate it by the liver and kidneys. Calomel treatment, not pushed quite to ptyalism, was adopted. A cathartic dose, followed by one-grain doses every hour or two hours, generally brought a blue line on the gums between the second and third days, and we found it best then to stop the mercurial. In very few cases was severe salivation produced. The medical officers who had any considerable experience in this epidemic agree with me as to the utility of mercury. Besides this we gave as a drink ice-water acidulated with bitartrate of potassa: ice and the smallest portions of animal jelly and beef-tea were employed: sinapisms and blisters were useful over the stomach, and minute doses of ipecacuanha sometimes stopped the vomiting. We derived no benefit

from acetate of lead. Occasionally, in the third stage, small doses of opium of morphia were useful; and generally, in that stage, mild stimulating drinks, such as iced sherry, were grateful and soothing to the patient. Prompt and active treatment in the early stage was found to be necessary. Later, the expectant plan was as good as any; but I should not dare trust it from the beginning. Several cases recovered after black vomit appeared, but in no case could this result be attributed to treatment. In no disease that I have seen is careful nursing so much demanded.

I cannot speak in terms too high of the noble conduct of the medical officers here. To Surgeon C. A. COWGILL, U. S. Vols., Surgeon NATHAN MAYER, 16th Conn., Surgeon P. B. RICE, 132d N. Y., Ass't Surgeon J. H. DOUGHTY, U. S. Vols., Ass't Surgeon E. F. HENDRICKS, 15th Conn., Ass't Surgeon J. M. DAVIES, 9th N. J., Dr. J. W. PAGE, U. S. Sanitary Commission, and many other brave men who did their whole duty, soldiers and citizens alike are under lasting obligations for their heroic labors.

The inefficiency of a quarantine, consisting merely of detention for a given number of days, was so manifest in 1862 that the late Surgeon General CRANE insisted on non-intercourse for the protection of a threatened locality. Obviously this is the only sure method; and when the conditions are such as to admit of its successful operation troops should always be thus protected. Commercial intercourse, however, does not brook an interference of this kind with its progress, and occasions may occur when even military command is incompetent to control the conditions that may arise to render intercourse imperative. Fortunately, recent progress in sanitary science and experience in the prevention of yellow fever have demonstrated that protection may be afforded, not only without the promulgation of an ordinance of non-intercourse, but even without the detention involved in the original acceptation of the term quarantine. Sanitary supervision and disinfection have been substituted, and at the present time enable our health boards and quarantine officers to protect the community without materially interfering with the current of commercial enterprise.*

The depopulation of the city of New Berne in 1864 saved many of its garrison and inhabitants from falling victims to the fever. After the disease had fairly broken out among the troops most of them were removed from the town, and nearly all of those thus removed escaped. This experience was repeated in the yellow fever epidemic of 1867: Where the troops faced the pestilence, as at Galveston, Houston, Hempstead, New Orleans and Fort

* Until the establishment of the National Board of Health in 1879 the United States had no competent protective system against yellow fever. For many years before that date the sanitarians of the country and the leading public health officials were well aware of the principles which underlie such a system. The meetings and transactions of the American Public Health Association extended the knowledge of these principles and prepared the way for subsequent concert of action by the health officers of threatened ports. A central health office, which should co-ordinate the efforts of the various State and municipal health authorities, was regarded by all as essential to protection. The quarantine powers vested in the State and local authorities were effectively exercised by some, but their beneficial results were counteracted by the ignorance or carelessness of others or the imperfection of their quarantine regulations. At that time the National Government took cognizance of the danger only by the provisions of an act passed in 1798 authorizing the officials of the revenue service to aid the local authorities, when requested by them to do so, and when such assistance could be rendered without interfering with their own duties. Ass't Surgeon HARVEY E. BROWN, U. S. A., in a *Report on Quarantine*, submitted to Congress in 1872, exposed the weakness of the want of system then prevailing, and indicated the general character of the needful remedial measures. Touching national supervision, he held that in the administration of the War Department alone is found that freedom from political influences and that authoritative management which, while demanding absolute obedience, gives to the individual the largest liberty consistent with public safety. Hence he recommended that the general management of affairs should be conducted by the Surgeon General of the Army, aided by inspectors detailed from his corps of officers. The Surgeon General, in forwarding this report to the Secretary of War for transmission to Congress, objected to this recommendation on the ground that the Army Medical Corps as then constituted would be unable to furnish officers for quarantine duty without serious interference with its own military duties and detriment to the interests of the service. No efficient action was taken by Congress until 1879, when a central body, the NATIONAL BOARD OF HEALTH, was organized to advise the National and State authorities on matters pertaining to the public health, and to co-operate with the State and local health boards and officials in preventing the importation of foreign pestilence and in restricting its spread should it unfortunately succeed in effecting a landing. On the recommendation of this board efficient and uniform regulations were adopted by the various ports exposed to danger. By the co-operation of the Consular Service it was kept informed of the sanitary condition of all foreign ports having communication with this country, and was thus enabled promptly to notify the local authorities when danger threatened. It endeavored, by medical inspection and disinfection at foreign ports, to have all vessels bound for ports of this country in a satisfactory sanitary condition before beginning their voyage. The certificate of its agent at the port of departure had weight with the authorities at the port of entry, who granted admission if the vessel was said to be entitled to free pratique and nothing had occurred during the voyage to change her status in this respect. The movements of a vessel suspected of infection, on account of having failed to submit to inspection prior to leaving the foreign port, were communicated to the officers of the port of destination, who, on her arrival at their station, applied such measures of disinfection as her condition required. Refuge stations were established at certain points on the coast to which infected vessels, denied entrance to port, were sent for treatment. These fulfilled the role of quarantine stations for many small ports on the Gulf and Atlantic coasts, the commerce of which, although as dangerous in this connection as that of the larger ports, was inadequate to equip and maintain the requisite quarantine establishment. Here the passengers and crews were kept under observation or treated in hospital, according to circumstances, and the cargo and vessel submitted to a thorough cleansing and disinfection. By this system infected vessels only were delayed,—and not for an arbitrary period but merely until disinfection was satisfactorily effected. Under the auspices of the National Board of Health the pathway of commerce was freed from vexatious restrictions and unnecessary obstacles, while the country was protected against the unanticipated arrival of the disease on its shores, and the people of the exposed sections realized a feeling of security to which they had heretofore been unaccustomed. Its experience has demonstrated that protection may be obtained without a recourse to non-intercourse or indiscriminating quarantines of detention.

Jefferson, the great portion of those exposed were attacked. Where, on the other hand, as at Indianola, Mobile and Pass Christian, the commands were removed after the outbreak of the disease, nearly all the men escaped. Since then the prompt removal of troops from points threatened with infection has lessened the ravages of yellow fever at our Southern military stations.*

CHAPTER VIII.—ON SCURVY.

PREVALENCE, ETC.—According to the statistics of this office the average annual rate of cases reported from military commands under the heading *Scorbutus*, during the eighteen years before the war, was 26.3 per thousand of strength, or, as will be seen directly, nearly twice as large as that which prevailed among our white troops during the years of the war. The medical officers of our Regular Army, by virtue of their experiences at remote frontier posts, were well qualified to detect the existence of this diseased condition. Surgeon CHARLES S. TRIPLER, U. S. A., who was Medical Director of the Army of the Potomac when scorbutic symptoms were discovered in it during its operations on the Peninsula, had already placed his experience and views on record;† and many references to scurvy are to be found in the published reports of Army Medical Officers,‡ although descriptions of the scorbutic condition itself are rare. §

* In more recent epidemics affecting the civil population, as in those which scourged Memphis, Tenn., in 1878 and 1879, depopulation, by the establishment of camps at some distance from the city, certainly saved many lives. At Camp Marks, which was established July 28 and broken up Oct. 28, 1879, the average number of rations drawn was 1,304. Nine cases of yellow fever occurred, of which none were fatal. Two of the inhabitants of this camp were taken with fever after their return to the city when the settlement was broken up. At Camp Williams, which was distant only four and a half miles from Memphis, a large number of cases occurred, but invariably in persons who had violated the rules by visiting the city or in refugees who sought the camp while already infected. As many as seventeen of the latter died in one night; yet it is said that in no case was the fever communicated to those in the camp. See paper by Col. JOHN F. CAMERON of Memphis, in *Reports and Papers*, American Public Health Association, V, 1879, p. 158, in which the author strongly urges depopulation as a saving measure in fever-stricken cities.

† In the *Cincinnati Lancet and Observer*, Vol. I, 1858, p. 131 *et seq.* His able article investigates the theories of causation and much of the recorded experience on prevention and cure. He concluded that abstinence from fresh meat and vegetables, by diminishing the needful proportions of potash and iron in the blood, induces scurvy; and that in the absence of a proper dietary the disease should be treated by salts of these bases, the potassio-tartrate of iron being suggested as capable of fulfilling all the indications.

‡ A scorbutic tendency was developed at most of our military posts during the winter season, after the troops had been for some months confined to the use of the ordinary ration with desiccated vegetables. The latter in the quantities issued failed to repress the disease. At posts which could be readily supplied with potatoes only the taint was manifested, on account of a want of liberality in the issues; but at those in the interior, which were reached by a tedious overland journey, the disease became one of the first importance. The capabilities of the soil had not been tested by the cultivation of post gardens, but in the spring and summer every plant of assumed anti-scorbutic value growing in the vicinity was carefully gathered for use. The conditions affecting the dietary of the men at these stations may be appreciated by a perusal of the reports published by Ass't Surgeon R. H. COOLIDGE, U. S. A., in his *Medical Statistics of the United States Army*, 1855–60; Washington, D. C., 1860. For instance:—Ass't Surgeon D. L. MAGRUDER stated, in a report from Fort Lookout on the Missouri river, in Nebraska Territory, October, 1856, that should any accident prevent the arrival of a supply of fresh vegetables this fall, it would be his misfortune to witness another scorbutic epidemic before the return of vegetation in the spring. Surgeon T. C. MADISON wrote from Fort Randall, September, 1857, that scurvy was the only disease about which the slightest apprehension was felt. During the previous winter the whole command was more or less affected before the arrival of a supply of Irish potatoes in January enabled him quickly and effectually to suppress the disease. These vegetables had been shipped from St. Louis, Mo., in the fall, and had become frozen while *en route*, but their anti-scorbutic properties had not been destroyed. They were used raw as well as cooked. At this post lime-juice, pickles, molasses and dried fruits were issued along with the ration, but in the quantities furnished they did not prevent the appearance of scurvy. The wild artichoke, edible from the beginning of April to the middle of May, was eaten raw, grated or sliced, with vinegar; later in the season other greens were used. Ass't Surgeon E. W. JOHNS, writing from Fort Laramie, December, 1858, considered that there was little of interest to report except what related to scorbutic disease. He used the juice of cactus plants, which, in the absence of any other curative agent, effected a wholesome change in the system, as complete, although not so rapid, as that resulting from the use of potatoes. The juice was prepared by broiling the thick leaves slightly over a fire and then slicing and digesting them in water until a thick greenish-brown mucilaginous mixture was obtained. A tumblerful of this mixture, with two ounces of whiskey, flavored with essence of lemon, was given as a dose. At this post stores of water-cresses were collected and used at the mess tables; and so highly was the importance of this addition to the diet appreciated that the colonel commanding superintended the search for the plant. Going back to earlier times, a severe outbreak of the disease occurred in 1820 at Council Bluffs and St. Peter's. The strength of the former post January 1 was 788, of the latter 228, making in all 1,016. The total of cases of all diseases reported at these two posts during the quarter ending March 31 was 895. Of these 503 were of a scorbutic character; and the number of deaths from this cause was 168, of which 157 occurred at Council Bluffs. According to Surgeon MOWER, neither small-pox nor Asiatic cholera, in their most malignant forms, was so dreadful as this outbreak of scurvy. See FORRY—*On Scorbutus—American Journ. Med. Sciences*, N. S., Vol. III, Philadelphia, 1842, p. 77.

§ R. S. HOLMES, formerly of the U. S. Army, has given in the *St. Louis Medical and Surgical Journal*, Vol. V, 1847–8, p. 417 *et seq.*, some account of the disease as it occurred among the troops in Florida. He also saw it elsewhere in this country and in Mexico, and from its diversified character and the absence of symptoms commonly considered diagnostic, he is convinced that the disease is often overlooked, and that cases of true scurvy are sometimes

The majority of our volunteer medical officers had, on the contrary, at the beginning of the war no personal familiarity with the disease; nevertheless few of them failed to recognize the possibility of its occurrence or to look closely after the health of their men with the view of detecting its earliest manifestations. In fact, the first intimation of a scorbutic tendency among the troops, so far as is shown by the records, came from a volunteer medical officer, Surgeon DAVID WOOSTER, 5th Cal., encamped near Sacramento, Cal. His reference, which is dated Jan. 13, 1862, is as follows:

I have found chlorate of potash invaluable in the first symptoms of scurvy: Tender gums harden as if by magic under the use of a drachm a day in two ounces of simple syrup.

The figures submitted in the first part of this work indicate that scurvy was present in our armies from the first month for which reports were forwarded, May, 1861, to the close of the war. In the month stated 7 cases were reported in a strength of 16,161 men. These may be regarded as a contribution from the conditions that were in existence before the war. The continuance of the disease after the cessation of hostilities was mainly due to a recurrence of these conditions.

Among the white troops during the five and one-sixth years covered by the statistics 30,714 cases of scurvy were reported; and 383 deaths were attributed directly to that disease. These numbers are equivalent to 71.2 cases and 0.82 deaths in every thousand men of average strength present during the period. The fatality of the disease was not large, 1.25 per cent. or one fatal case in eighty, although nearly one-half of the deaths from this cause occurred in general hospitals in the cases of men received from Southern prisons and not recorded in the list of those taken sick with scurvy. This, however, may be considered offset by the cases of diarrhœa which owed their persistence and fatal ending, perhaps also their origin, to the scorbutic cachexia.

The prevalence indicated by these statistics might be regarded as suggesting the presence of a very notable scorbutic taint in an army, but it must be remembered that these numbers are the aggregate of a series of years, and that the average annual rate of cases amounted only to 13.8 per thousand of strength, or to the development of scorbutic symptoms in one man in every company of 72.5 men. Moreover, it seems probable that these rates greatly overestimate the extent of the pervasion of our white regiments by the scorbutic taint. It is usually considered that if one man in a command be affected with well-developed signs of scurvy many other men in that command, all of whom have been subject to the same dietary, will be more or less disabled, although they may not be borne on the sick-report. This assumption is indisputable; but it is questionable if all the cases that were reported as scurvy by our medical officers actually presented the characteristic signs of the disease. Medical statistics are of no value unless all the circumstances attending their collection be

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mistaken for other diseases and treated as such. He holds it as an error to suppose that depression of spirits, loss of strength, affection of the gums, sallow appearance and livid patches are present in every case of scurvy. In doubtful and obscure cases the only well-marked proof of the presence of the scorbutic taint is found in the results of treatment: If an ophthalmia, or an ulceration of the leg occurring in a person who previously subsisted on salted provisions without vegetables, should persist under ordinary methods of cure and yield to acid drinks and a diet of vegetables, the presumption is strong that the disease was connected with the scorbutic taint. The symptoms most commonly observed were liver-colored patches on the arms, legs and chest, and a puffy or tender and bleeding state of the gums, with a tendency of the teeth to become loose. A frequent sign of the disease as observed in Florida consisted of extensive superficial ulcerations following the rupture of bullæ on the feet, ankles and between the toes. At first the origin of these was not suspected, and cases were borne on the sick-list for three months, when their cure was brought about probably by the anti-scorbutic diet that was habitually used in the hospital as far as circumstances would permit. Subsequently the affection was cured in a few days by drinks of lemonade, or what was considered better, a mixture of vinegar and nitrate of potash and a diet of vegetables. Ulcers on the legs, suppurative inflammation after wounds, a foul state of the socket after the extraction of a tooth, a peculiar susceptibility to salivation from mercury and other medicines, were also among the more common effects of scurvy, and associated with these were muscular debility, derangement of the bowels, depression of spirits, a sallow countenance and bleeding gums. Soldiers suffering from inflammations complicated with the scorbutic taint formed a large proportion of the patients in Florida. These were prone to relapse,—a return to their former diet in quarters was followed in a week or ten days by the reappearance of their complaints.

clearly appreciated. The writer knows, from his local experience in the Army of the Potomac, that after the first alarm of scurvy in the ranks of that army many medical officers continued on the alert for a recurrence, and cases which, but for that alarm, would have been returned as diarrhœa or rheumatism, found place on the Monthly Reports as veritable scurvy.

During the twenty-seven months, April, 1854, to June, 1856, inclusive, the French army in the Crimea, averaging 86,740 men, reported 23,250 cases of scurvy and 645 deaths from that disease irrespective of those that occurred among the large number of cases sent home for treatment.* These numbers are equal to 268 cases, of which 2.5 per cent. were fatal in every thousand of average strength present. The annual rate of prevalence amounted to 119 cases per thousand, or to one man with characteristic scurvy in every squad of 8.4 men.

To judge from the statistics of uncomplicated scurvy the English army was comparatively free from the disease, as only 2,096 cases and 175 deaths were reported during the whole period of twenty-seven months.† Most of these occurred during the seven months, November, 1854, to May, 1855, inclusive, giving a rate of 55 cases per thousand men for this period, or an annual rate of 94.3, equivalent to one man with marked scorbutic symptoms in every squad of 10.6 men.

During the early months of the campaign in the Crimea both armies remained free from scurvy, a result attributed to the quantities of grapes and cabbages gathered by the soldiers while on the march from Kalamita Bay to Balaklava. But in November, 1854, the disease appeared in the ranks and increased rapidly in the English army until the following February, after which, under the free use of lime-juice and issues of potatoes, its threatening aspect was immediately subdued. It continued, however, to furnish a few cases monthly until the end of the campaign. In January, 1856, these numbered 58 and were equal to one per thousand: in the other months they did not reach this rate and were not recorded in the official table of sick-rates. In the French army, on the contrary, the disease was prominent throughout the war.

The death-rate among the English cases shows decidedly that the same methods of recording the statistics of scurvy did not hold good in the allied armies: for while in both the disease was clinically identical, a death-rate of 8.4 per cent. prevailed in the English hospitals as compared with 2.8 per cent. among the French troops. English medical officers have reported that although comparatively few cases of pure scurvy were noted in the returns nearly every admission into hospital for other diseases exhibited unequivocal signs of the scorbutic taint. Apparently French military surgeons sent their men to hospital when presenting signs of scurvy, but in the English camp such cases were not taken on sick report until the disease was in an advanced stage unless some intercurrent attack, to which the morbid condition of the blood rendered the men peculiarly susceptible, called imperatively for treatment. But even in the French practice, as stated by M. BAUDENS, soldiers were rarely sent to hospital during the first stage of the scorbutic malady when the characteristics were a hemorrhagic disposition, great muscular lassitude and pains, particularly in the legs and feet, weakness of pulse, loss of appetite, a notable discoloration of the skin and a remarkable dilatation of the pupil: yet most of the men admitted for other maladies had these constitutional evidences of the scorbutic affection.

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* *Rapport Medico-Chirurgical sur la Campagne de Crimée*, par J. C. CHENU. Paris, 1857. See his *Expérience Statistique des fièvres paludéennes*, p. 1 *et seq.*, and Tables 33, p. 265.

† *Medical and Surgical History of the British Army in the Crimea—Official Report*. London, 1858. See articles on Scurvy, Vol. II, p. 171 *et seq.* and Tables A and B.

Our medical officers, perhaps from their unfamiliarity with the disease, paid much attention to the early symptoms; and certainly of the 30,714 cases reported by them a large majority were never admitted into hospital, but were excused from duty and treated in quarters until the symptoms of the first stage, which gave them a place on the sick-report, had subsided. In fact, a comparison of the records of our armies with those of the allied forces in the Crimea shows that our Medical and Supply Departments have reason to feel gratified with the success of their efforts to banish scurvy from our ranks.

Ass't Surgeon E. S. DUNSTER, U. S. A., on special duty as an inspector of hospitals and camps, was the first to call attention to the probable presence of a scorbutic taint among the troops operating in the East. His report is dated New Creek, Va., April 27, 1862.

The 8th, just from Parkersburg, is under orders to proceed to Moorefield. I am decidedly of the opinion that this regiment should be allowed more time to recover from the debilitating condition that ensued from the winter's residence in Buffalo. You will remember in my report that I referred to the (as I called it) latent scorbutic condition of the men; its effects are still visible, though there has already been a manifest improvement; and I think a few weeks camping in some healthy place like this would put the men in fine condition.

Shortly after this time rumors were current of the existence of scurvy in the Army of the Potomac. These ultimately took official form, and indicated two brigades, one of which consisted of regular troops, as the commands specially affected. Medical Director TRIPLER, who was well informed concerning the dietary of the regular brigade, could scarcely believe that these men should be the first to manifest scorbutic symptoms. Nevertheless he procured suitable supplies and, proceeding to the front on May 22, investigated the condition of the suspected regiments. The men were found free from taint. Dr. TRIPLER reported to the Surgeon General as follows concerning this reported outbreak:

I received a telegram while I was at White House engaged in organizing a general hospital, informing me of the appearence of scurvy in two brigades and directing me to send for lime-juice, etc. I telegraphed you, May 21, for lemons, in obedience to that order, expressing at the same time my doubt of the accuracy of that report. This doubt was based on the fact that one of the brigades was that of the regular infantry. I knew that these troops had been furnished with desiccated vegetables and that some of them had used them regularly. Orders for this issue had been promulgated long before, with instructions as to the method of cooking to be adopted by the troops. I called upon the Chief Commissary and learned that the men very generally refused to use the desiccated vegetables; that he had abundance of them and could not get rid of them. Even potatoes had been suffered to rot upon his hands and in the camps. A general order was again applied for, and issued on the 23d of May, requiring the troops to draw and use the desiccated vegetables in soup daily, unless prevented by being actually on the march, prohibiting the frying of meat and commanding it to be always roasted or boiled. Upon my arrival at headquarters I inquired into the grounds of the report, and learned that it had been made by the Medical Director of General Fitz-John Porter's Corps, Dr. GEORGE H. LYMAN. This gentleman, one of our ablest and most energetic officers in the volunteer service, informed me that he had not seen any cases, but he had considered it his duty to make known, for prudential reasons, as soon as it was mentioned to him, that it had been reported to him by Brigade Surgeon WATERS and by some young assistant surgeon of the Regular service. I sent for Dr. WATERS and found he had seen no cases; that it had been reported to him by some volunteer regimental surgeon. I directed him to have the men brought to me immediately for inspection. He subsequently reported to me that the patients had been sent to the general hospital at the White House. A short time afterwards I visited this hospital and then found two cases set down as scurvy. I examined these: one had no sign of scurvy, and the other was a robust man with an erythematous patch upon one shin, swelling of the leg and knee, discoloration of the ham without hardness, and no swelling or sponginess of the gums. The affection came on, according to the account of the patient, in one night from sleeping without shelter after a hard day's march through deep mud. I could not consider this case scorbutic under the circumstances, and accordingly, feeling relieved as to the fact, I reported that no scurvy existed in this army. About that time the lemons arrived and were distributed among the several corps.

But three weeks later, on June 14, there were discovered in the 19th and 20th Mass. six men showing symptoms of scurvy and others "acquiring a predisposition to the disease." Surgeon J. F. HAMMOND, U. S. A., Medical Director of Sumner's Corps, to which these regiments belonged, stated that the 19th had become generally, indeed almost universally, affected with scorbutic symptoms, and reported on medical authority that similar cases had been observed in another brigade of the corps. As explanatory of the outbreak he was

informed that the desiccated vegetables were so disagreeable to the taste that the men would not eat them. Ass't Surgeon A. K. SMITH, U. S. A., was immediately despatched by Medical Director TRIPLER to inspect the men said to be affected. He confirmed the truth of the report, whereupon the commissary of subsistence at White House was telegraphed to send potatoes, dried apples and pickles to Sumner's Corps. At the end of the month Surgeon J. F. DYER, 19th Mass., furnished a report of the condition of his command, showing 18 cases of pronounced scurvy, 100 of the scorbutic taint, and many of diarrhœa which he attributed to the causes of scurvy, inasmuch as it was controlled when the patients had access to a free supply of vegetables.

During the quarter just ended the regiment has been on the peninsula before Yorktown and Richmond. The labor of the men has been arduous and their exposure great. These causes, with an almost total deprivation of fresh vegetables and fruits for three months, have in my opinion laid the foundation for serious disease, which has in many cases made its appearance in the form of scorbutus. Eighteen cases of this disease, in the form of ulcerations, hemorrhages and eruptions, have been noticed during the past month, and nearly one hundred have been found with spongy and bleeding gums. Diarrhœa has also been apparent, depending, it appears to me, upon the same cause, and disappearing whenever the patient could have access to vegetables in any considerable quantity.

Surgeon NATHAN HAYWARD, 20th Mass., rendered a similar report:

In addition to the number of cases reported as taken sick during the month, some two hundred and forty men of the regiment showed more or less decided marks of scorbutic disease, and were treated as far as practicable by the administration of raw potatoes and vinegar. These cases were in most instances too slight to warrant putting the men in quarters, and hence they do not appear in the report. In many other instances the scurvy taint was only apparent in its modification of other diseases. Thus a large number of the diarrhœas were characterized by passive hemorrhage and a peculiar intractability when treated by ordinary methods, yet they yielded readily to vegetable acids and anti-scorbutics when they could be procured.

The usual marks of the disease—swollen and ulcerated gums, painful swellings of the muscles, languor, nostalgia, petechial eruptions and ecchymoses—were observed. The cause of its appearance can readily be found in the exposure of the regiment to the depressing influences of cold, wet, hunger and miasma during the ten or twelve days following the battle of Fair Oaks, combined with the absence of vegetables. The difficulty of obtaining even the usual ration of fresh vegetables has placed an insurmountable obstacle in the way of the efforts of the medical officers to arrest the spread of this disease, and unless potatoes, onions and other vegetables are soon supplied in liberal quantities there is reason to apprehend its manifestation in more serious forms.

Various other medical officers noted in their reports for June the presence of a scorbutic taint, which in some instances in July became developed into unmistakable scurvy.*

Surgeon H. F. VAN DERVEER, *5th N. J., Camp near Alexandria, Va., Oct.* 21, 1862.—Scurvy commenced in the regiment towards the close of June. The causes of this epidemic were—1st, a want of vegetable food; 2d, exposure to wet and cold at night; 3d, an impure atmosphere, and 4th, the aggravation of all these causes by mental depression. The disease exhibited its usual symptoms—sponginess of gums and spots of purpura; contraction of joints and stiffness and pain of limbs were especially frequent and severe. No fatal case occurred. The epidemic reached its height about the first of August. During its prevalence diarrhœa and all other diseases were complicated with scorbutic symptoms. The means employed to combat the disease were fresh vegetables, a free supply of lemons, the salts of potassa and tincture of the chloride of iron. The use of these remedial agents was attended with considerable benefit, and the disease was diminishing when, on the 15th, we marched out of camp on the way to Yorktown. The change of air, the exercise of marching and foraging on the cornfields and orchards soon put an end to the epidemic.

Surgeon A. J. MCKELWAY, *8th N. J., Camp near Alexandria, Va., Oct.* 20, 1862.—In addition to the diseases specified as having affected the men of this regiment since their landing at Yorktown scorbutus made its appearance. Few escaped without showing some manifestation of the disease. The general symptoms were feelings of languor and debility; fatigue on the slightest exertion; the face presented a puffy appearance in many instances; the gums were spongy and swollen, the breath offensive, the legs in many cases mottled with purpuric spots; cases not so well developed nor so distinctly marked were attended with wandering neuralgic pains, at times attacking the spine and at other times producing pain or constriction of the chest with difficulty of breathing. One well-marked symptom in some cases, where the disease did not manifest itself in purplish spots, was rigidity of the muscles of the leg, spoken of as chronic rheumatism in the description of their feelings given by the sufferers. In some of these cases purpura shortly appeared, but in others who suffered precisely in the same way, malaise and debility included, these spots were never exhibited. The exciting causes can be easily found in the continued deprivation of proper vegetable

* Dr. FRANCIS R. LYMAN, house physician, Bellevue hospital, New York, remarks in the *American Medical Times*, Vol. V, 1862, p. 125, that of about one hundred soldiers of the Army of the Potomac admitted during July and August, 1862, thirty-five per cent. were affected with scurvy. Some of these men had been in Richmond hospitals. Debility and wandering shooting pains were sometimes the only grounds for a diagnosis. The diarrhœa, frequently present in these cases, abated as the general health became restored. Many after gaining in flesh, strength, appetite and spirits, continued to suffer from sore gums, excruciating pains and stiffness and swelling of the limbs.

food under which the men had suffered since their landing on the Peninsula. Doubtless other causes contributed to its production,—exposure, fatigue, exhaustion and other depressing influences; but the want of fresh vegetables and meat and the use of salt meat for months no doubt gave origin to the disease.

Ass't Surgeon C. S. WOOD, *66th N. Y., Sept.* 30, 1862.—At this time scurvy manifested itself in the most unmistakable manner. Nearly one-half of the regiment suffered from it during the month of June. Fresh vegetables were ordered, but, owing to the want of transportation, the quantity received was so small that its effect was hardly perceptible. Lemons, however, of which we soon had an abundance, controlled the disease.

Surgeon HENRY MCLEAN, *2d N. Y., Camp near Alexandria, Va., Oct.* 30, 1862.—The water was impure and the men for the greater portion of the time [at Harrison's Landing] scantily supplied with fresh vegetables. Symptoms of scurvy made their appearance. These cases, as well as those of associated diarrhœa, were benefited by the exhibition of dilute sulphuric acid.

Surgeon A. P. FRICK, *103d Pa., New Berne, N. C., Feb.* 25, 1863.—At this place [Harrison's Landing] scorbutus made its appearance, but this was speedily repressed by the liberal use of fresh vegetables, lemons, etc.

During the advance on Richmond and the retreat to Harrison's Landing there had been a constant strain on the mental and physical energies of the men, for their excitement had been as intense as their labors were severe. No fresh vegetables had been supplied. The desiccated vegetables were not liked, and there was seldom time to prepare them properly. Even the ordinary components of the ration were not always fully supplied, nor was time allowed for cooking. The men frequently ate their rain-soaked hard bread while under arms awaiting orders. Sleep was obtained by snatches on the muddy roads and fields and was broken by the call to arms. The troops marched by night, manœuvered and fought by day, and they were gloomy and despondent withal, because *en route* to the landing a series of harassing and deadly conflicts served only to secure the safety of the army. The hardships, privations and exposures of the seven-days' fight, added to those of a campaign which had already produced scurvy in some of the regiments, sufficed for a more extensive development of this disease. One of the first cares of Surgeon JNO. LETTERMAN, U. S. A., who relieved Surgeon TRIPLER as Medical Director on the arrival of the army, July 4, at Harrison's Landing, was to promote its recuperation by eradicating the scorbutic disease. Requisition was made for large supplies of potatoes, onions, cabbage, tomatoes, squash, beets and fresh bread. The first shipment of anti-scorbutics was received on the 7th; potatoes and onions reached the Landing on the 20th, and thereafter supplies were so abundant that they rotted at the wharf for want of some one to take them away. In addition to the vegetables and bread issued by the Subsistence Department, fifteen hundred boxes of lemons were procured by the Medical Purveyor for the various regimental hospitals. The beneficial effects of these issues soon became perceptible in the improved health of the men, and when the army left the Landing, August 16, scurvy had disappeared from its ranks. According to LETTERMAN a true idea of the improvement that took place could not be conveyed in writing, as there was so much in the appearance, in the life and vivacity exhibited by the men in their slightest actions, even in the tone of the voice, which conveyed to one's mind the impression of health and spirits, of recovered tonicity of mind and body and of the presence of vigorous and manly courage.

After this scurvy was no more seen in the Army of the Potomac except in isolated cases, although at times, especially after the conditions of an active campaign had prevented the issue of fresh vegetables and soft bread, a scorbutic complication of other diseases was considered by some observers as noticeable, and by others the increased danger attending diarrhœal attacks was attributed to the same cause. Thus Ass't Surgeon JOHN S. BILLINGS, U. S. A., in his account of the condition of the army in June, 1864, the second month of its advance from the Rapidan to Petersburg, Va., reported the existence of several cases of

well-marked scurvy and of a scorbutic element complicating other diseases;* and the present writer, when reporting the condition of the Second Army Corps in March and April, 1865, attributed the obstinancy of the diarrhœas which were then prevailing, and the great and rapidly-increasing prostration with which they were associated, to the absence of fresh vegetables from the diet of the command, although the only well-marked cases of scurvy present in camp were known to have contracted the cachexia while in Southern prisons.† The statistics of the army show that during the month of June, 1864, when Dr. BILLINGS made his observations, only 22 cases of scurvy were reported, or .22 per thousand of strength for the month; and in March and April, 1865, when a possible scorbutic condition of the Second Army Corps was suggested, there were reported from the whole army only 36 and 20 cases, or .33 and .26 cases per thousand respectively for each month. Practically that army was preserved from the scorbutic influence from the suppression of the outbreak in June and July, 1862, to the conclusion of its history. Medical Inspector JOHN WILSON, U. S. A., refers thus to its freedom from scurvy during the siege of Petersburg:

The ample supply of fresh and nourishing vegetables had an excellent effect in guarding the men from scorbutic taint. Never was so large an army so entirely exempt from this form of disease. This fact increases in sanitary significance when we consider that the depressing and exhausting influence of life in the trenches greatly favors the development of adynamic diseases. The demoralizing tendency of an almost unremitting sharpshooting fire produces under any circumstances more or less of that moral depression and physical depravation so favorable to dyscratic disease; yet notwithstanding this the most marked exemption from scorbutic disease has been enjoyed, and the health of the Army of the Potomac, during the months of September and October, has been of a most gratifying character.

About the time of the suppression of the epidemic in the Eastern army scurvy was observed in other portions of the U. S. forces. Brigade Surgeon CHARLES H. RAWSON, 5th Iowa, Acting Medical Inspector of the left wing of General Pope's command, adverts to a species of land scurvy as the most irregular and insidious of the diseases affecting the troops, and as, in his opinion, complicating many other complaints.‡ The following reports indicate its presence in detached commands:

Surgeon B. F. STEVENSON, *22d Ky., Portland, Ohio, Oct.* 8, 1862.—During the month of July we had a number of well-marked cases of scorbutus. They were sent to hospital without the lines, where a vegetable diet could be procured. Under this regimen they rapidly improved and were returned to duty. The prevalent opinion that attributes scurvy solely to the absence of vegetable nutriment will derive but little support from a history of the cases that occurred in this regiment:§ We had in all eleven cases of scurvy; ten of these were men of foreign birth, who indulge more freely in vegetable diet than do our native Americans. As these had for years been addicted to a free indulgence in spirituous liquors, may not the withdrawal of the long-accustomed stimulus have had a material influence in preparing the system for the inroads of the disease?

Surgeon JOHN W. SCOTT, *10th Kans.*—During the month of July, 1862, the regiment was, with other troops, in the Cherokee country, and, owing to the absence of fresh vegetables, was compelled to subsist mainly upon the army ration, in consequence of which a scorbutic tendency began to manifest itself in the shape of cutaneous eruptions and intractable ulcers in the mouth; but, owing to the promptness of the commanding officer in carrying out the recommendations of the medical officers, a supply of desiccated vegetables was procured and the unfavorable symptoms speedily disappeared.

Ass't Surgeon JOS. C. BAILY, *U. S. A., Paralta, N. Mex., Oct.* 6, 1862.—An abundance of grapes, green corn, beans and onions were immediately furnished the troops, with such good effect that by September not a sign of scurvy remained. Chlorate of potash was prescribed internally for the worst cases with unmistakable benefit.

Surgeon BASIL NORRIS, *U. S. A., Fort Craig, N. Mex., Sept.* 6, 1862.—The character of the pain in incipient scurvy is so like that in rheumatism as I have seen it in this Territory, that I am inclined to the opinion that a fair

* See his *Report*, page 199, Part First of this work. † Ibid, page 219.

‡ In a letter dated Corinth, Miss., June 21, 1862,—*American Med. Times*, Vol. V, 1862, p. 42: Some of the men affected had pale, waxy, puffy and anæmic faces; increasing debility; soreness, ecchymosis and swelling of the feet and legs; pains in the bones, muscles or any and every portion of the body; diarrhœa or irregular bowels and capricious appetite; comparatively few had the gums ulcerated. Sudden death in men apparently healthy was, by Dr. RAWSON, attributed to an insidious scorbutic taint. He had no opportunity of making a *post-mortem* examination in any of these suddenly-fatal cases, but was satisfied that death did not result from heart disease.

§ Surgeon STEVENSON does not appear to have noticed the support given to the prevalent opinion by the rapid improvement of his cases under a vegetable regimen.

proportion of all the cases of rheumatism occurring in this department may be successfully treated by fresh vegetables, fruits, lime-juice and other remedies adapted to the cure of scurvy.

Subsequent to this period occasional references to scurvy were made by various officers:

Ass't Surgeon A. R. RICE, *1st Mass. Cav, Beaufort, S. C., Oct.* 2, 1862.—In September we were much troubled with scorbutus; but with an abundance of fresh vegetables, I am happy to say, the disease is declining. I have found that painting the sores with tincture of muriate of iron promoted a healthy action.

Ass't Surgeon A. A. WOODHULL, *U. S. A., 2d and 10th U. S. Inf., Camp near Shepherdstown Ford, Md., Oct.* 9, 1862.—I have observed, not so much in my own command as in other regiments with which I have been casually connected, the signs of latent scorbutus. That diathesis in a number of cases, especially after long-continued fatigue, was exhibited veiling itself chiefly under the garb of obstinate chronic rheumatism. I attribute it to depressing influences at work upon systems that had been more or less debilitated by the privations of life on the frontier.

Surgeon W. W. BROWN, *7th N. H., St. Augustine, Fla., May* 1, 1863.—When the regiment left Fort Jefferson many of the men were beginning to manifest symptoms of scorbutic disease, such as spongy and bleeding gums and ulcerations of the legs. Slight scratches of the skin became, in some cases, ulcers, showing a cachectic condition, which no doubt would have assumed an alarming aspect had we continued as destitute of fresh vegetables as while at that post. [The regiment had been stationed at Fort Jefferson for three and a half months, and this service had been preceded by a sea voyage lasting nearly a month.] On our arrival at Beaufort, S. C., corn, watermelons, sweet potatoes and other garden vegetables soon arrested the progress of the disease, and its removal was completed by the oranges, lemons and limes which we obtained in abundance on reaching St. Augustine.

Surgeon CHARLES T. SOUTHWORTH, *18th Mich., Nashville, Tenn., June* 8, 1863.—Notwithstanding the advantages derived from rest, a clean and desirably situated camp, well-cooked rations, good tents, etc., I daily found the men becoming less susceptible to the action of remedial agents. With few exceptions all were suffering from scorbutic disease. Vesicants were surely followed by erysipelatous inflammation; scarifying and cupping had similar consequences, and in many cases a peculiar eruption existed. I immediately substituted fresh beef, soft bread and corn meal for the salt ration, beans and hard bread; vinegar, pepper and a few vegetables were also used. From that time to the present but little medicine has been employed. Now we have less than thirty sick in quarters. No disease assumes a malignant form, medicine has a happy effect, and the men are in good spirits, instead of being torpid and sluggish. * * * I consider beans the most indigestible of all vegetables, and if this be true they are of course the most injurious. The bean, let it be cooked as it may, ferments in the stomach before it is digested, and an irritated alimentary canal is the necessary consequence; it also gives to the system a vast amount of carbon, which is not required in this warm climate, nor in any climate with the thermometer at 90° Fahr. Corn meal, on the contrary, is generally grateful to the stomach, affects the bowels sufficiently to maintain them solvent and thereby prevents the accumulation of irritating substances. It has as much nutriment as the system requires, and it can be prepared in many different ways. I have known 7,000 men march for twelve successive days (in the Mexican army in 1852) with no other ration than one quart of parched corn daily, and without five sick in the whole division to which I belonged. Scurvy is a disease almost unknown in that army; and corn is at all times the principal article of food and at many times the only one the soldiers can obtain.

Lieut. Col. F. H. HAMILTON, *Medical Inspector, U. S. A., June*, 1863: *Inspection of troops at Nashville and Murfreesboro', Tenn.**—The *4th East Tenn. Inf.*, nearly 800 strong, is composed almost entirely of refugees from Eastern Tennessee. Nearly all of these men have been hunted by their enemies and have lived for a time among the mountains before they were able to get within our lines, subsisting by chance, and in most cases unable to procure vegetables or indeed food of any kind except in small quantities. The regiment has been organizing for several months by companies which were filled up gradually as the men came in. Since their enlistment until recently they have had no fresh vegetables. * * * They need especially fresh vegetables and water-proof blankets. * * * Vaccination, which has been practiced pretty generally among the men, has in most cases made large and unhealthy ulcers, causing swelling and suppuration of the axillary glands. Several of the cases were brought to my notice. There have also been some cases of idiopathic erysipelas. It will be fortunate if, in this condition, the men are not called into an engagement; their wounds would generally no doubt prove fatal.

The 4th East Tenn. Cav.; 600 men; refugees. Five companies have been organized since the middle of December, 1862. Up to the first of April last they had received almost no fresh vegetables,—since that date about one ration of potatoes every two weeks. From April 25 to May 10 more than one hundred men were vaccinated, of whom many are still suffering from ugly ulcers and suppuration of the axillary glands. About seven cases of idiopathic erysipelas have occurred. These men need vegetable food.

The 1st Middle Tenn. Inf. was organized in April, 1862. The regiment has been in no battle and has not done much marching. It was recruited mostly from Nashville and its vicinity. The men have had very few fresh vegetables since their entry into the service. A good many cases of scurvy have appeared, and slight wounds have not healed kindly. The whole regiment was vaccinated four weeks since, and about one-third became affected with intractable ulcers,—many not yet healed. In several cases the axillary glands suppurated. There have been several cases of idiopathic erysipelas lately, with diarrhœa. This regiment is still suffering for want of vegetable food.

The 22d Mich. Inf.; 640 men; organized July 31, 1862. Up to April 1 almost no issues of fresh vegetables were made; since then about one ration of potatoes every two weeks. Vaccination has left large and obstinate sores in a great many cases. These men need more fresh vegetables.

* Dr. HAMILTON refers at some length to these experiences in his *Treatise on Military Surgery and Hygiene*, New York, 1865, p. 80 *et seq.*

The 18th Mich. Inf.; 436 men. This regiment has been in service for about nine months; during the first seven months it received almost no fresh vegetables, but since April 1 five full rations of potatoes per man have been issued. [Here Inspector HAMILTON quotes at length from a report by the surgeon of this regiment, the substance of which, as relating to scurvy, has already been submitted.]

The 10th Ill. Inf.; 546 men. This regiment has been in service nearly two years, and until April 1 last the colonel does not recollect that an issue of fresh vegetables was ever made. There has been a great deal of scurvy but it is now disappearing.

The 85th Ill. Inf.; 480 men. The regiment has been in service about nine months; it received almost no fresh vegetables until April, 1863. The men have been scorbutic but are now improving.

The 86th Ill. Inf.; 600 men; in service nine months; first vegetables received April 1, 1863. Scurvy, which was present, is disappearing and all diseases are becoming milder.

The 125th Ill. Inf.; in service eight months; first issue of fresh vegetables April, 1863. The men have been scorbutic but are now improving.

The 60th Ill. Inf.; 588 men; mustered into service Feb. 17, 1862. The colonel says he has received for his men more fresh vegetables from the Sanitary Commission than he ever received from the Commissary, and that he does not know what he should have done without that aid.

The 52d Ohio Inf.; 532 men; in service nine months. Fresh vegetables received in April and May, but very seldom before that.

The 5th Ky. Cav.; 397 men. There is a slight tendency to scurvy among the men, and a little intermittent fever. They are now receiving about one ration of potatoes per week. They were mustered into service eighteen months since, but until within the last few months have had very few fresh vegetables.

The 16th Ill. Inf.; 583 men. The regiment is encamped on the north side of the Cumberland river, opposite Nashville, on rather low sandy soil. The health of the command is excellent. There is not a man in this regiment but can read and write; one hundred and sixty are members of a temperance society; they have a schoolmaster and a gymnasium. The colonel assures me that his men all use desiccated vegetables when they can get them, but they cannot draw them at present. Until late in April they had drawn but one ration of fresh potatoes in sixteen months; since then they have drawn four full rations. They have only 15 men sick in hospital and quarters; not one in hospital in Nashville, and only about 15 men absent in any hospital, and these are mostly detained as nurses. The good health of this regiment I ascribe to their good habits and discipline and to their free use of desiccated vegetables.

The troops at Murfreesboro'.—The scorbutic taint continues slowly to disappear; but a good many well-marked cases remain in the field and general hospitals. Potatoes continue to arrive, and the commissary has been able during the month to issue three full rations per week, and lately one full ration per day; but the enlisted men do not generally get more than one-half or one-third of the rations issued. The last arrivals of potatoes are all sprouted and many are decayed; it is probable, therefore, that very few more will be received in a condition proper to issue. Sufficient attention is not paid by the buying and shipping commissaries to the ventilation of the barrels. A subsistence officer at Murfreesboro' informed Surgeon PERIN and myself that he had to open the sides of all the barrels after their arrival. The consequence is that when opened they are already decayed or mouldy. Those forwarded by the Sanitary Commission are opened before being shipped, and they arrive in a much better condition than Government potatoes. * * * The sick at this post, with the exception of those affected with small-pox, are now gathered into the General Field Hospital, where 300 hospital tents have been pitched, giving a capacity of 2,075 beds. The hospital garden is already beginning to supply onions, lettuce and other early vegetables in great abundance. The Invalid Camp, established also in tents inside the fortifications, is a model of neatness and order. To Medical Director PERIN too much credit cannot be given for his increasing vigilance and attention to the wants of all portions of this command, but especially for what he has accomplished for the troops both in hospitals and in the field in and about Murfreesboro'.

Appended to Dr. HAMILTON's Inspection Report are two special reports, one by Surgeon R. J. FARQUHARSON, 4th East Tenn., and the other by Ass't Surgeon N. B. SISSON, 92d Ohio, to illustrate the conditions that developed the scorbutic taint in these commands.

Surgeon FARQUHARSON says:—The men are almost entirely refugees from East Tennessee, and for some time previous to their enlistment were subject to many hardships from exposure to the weather, scanty clothing and imperfect, meagre and monotonous diet. Indeed, after having subsisted for periods varying from a few months to a year upon corn bread and bacon, they entered the regiment during the past winter and have since been upon the army ration for a longer or shorter period. The most immediate and obvious consequence of this has been the development of that scourge of armies, scurvy, in some of its protean forms. To account for its production one needs but consider the composition of the army ration, abundant in carboniferous and nitrogenous principles but almost entirely deficient in any manifestly anti-scorbutic agent. Three items of the ration only partake of this nature, viz: vinegar, molasses and potatoes; of these the first, to be efficacious as a preventative of scurvy, would have to be issued in larger quantity, and to be cider or wine vinegar instead of that prepared from spirits by the German method; the second is in small quantity and of doubtful virtue; the third would be of much importance if it were issued regularly, and also if the men could be induced to eat it in its most powerful anti-scorbutic state, viz: raw.

Some two or three months before I joined the regiment, in June, many of the men were vaccinated in Louis-

ville, Ky., by the assistant surgeon, with matter furnished by authority, and which in a few cases produced the ordinary effects, leaving behind the approved scar; but of its strange and dire effects in the great majority of cases I can best give an idea by stating the condition of these men when I joined. The scar was, in some instances, broad, smooth and flat, without the slightest appearance of pits; in others it was raised above the surface and lacerated, presenting the appearance of a large wart. About the period of cicatrization two sequelæ generally appeared, sometimes separately, but often in the same patient: a particular eruption, resembling ecthyma, in the immediate vicinity of the scar, and an inflammation of the lymphatic glands of the axilla, those of the lower part of the neck just above the clavicle being in a few instances also affected. These enlargements were, as a rule, cold and indolent, ending by resolution in most cases, in a few by suppuration and open abscess. In other cases the arm presented two or three sores, corresponding to the points of vaccination, covered by thick scabs of a dirty-white or yellowish color, with dark pus oozing from breaks in the crust at the edges or on the surface. In some persons the sores coalesced, forming an ulcer embracing all the points of vaccination. When these scabs came away or were removed by poultices the well-defined scorbutic ulcer presented itself, with raised edges, smooth or jagged, and the cup-like cavity filled with dirty sanies when the ulcer is phagedenic or extending, or with large flabby granulations when showing a disposition to remain stationary or to heal. These ulcers were indolent or irritable in different patients. Ulcers of this kind resulted not only from vaccination but from slight abrasions of the skin; examples may be instanced as resulting severally from a slight burn of the finger, from a scratch of the forearm by a pin and from a wound of the hand by a thorn.

Upon a general examination of the men the following conditions were observed: In most cases a complaint of malaise or debility, which prevailed to such an extent and in so marked a degree as to present to a casual observer the appearance of confirmed laziness, the men sitting down even when you were talking to them, and exhibiting, when apparently well, the greatest lassitude and indisposition to duty, indeed to exercise of any kind. They were not anæmic, but rather dark and ruddy. Headache was common, as were also dyspeptic symptoms, loss of appetite, gastralgia, vomiting and eructation of food. The pulse was smaller and more rapid than in health. The tongue in almost all cases presented the same appearance—broad, flabby, smooth and without the slightest appearance of fur no matter what might have been the immediate disease for which the patient presented himself; in a few cases in which the stomach was implicated the tip was red and papillæ prominent. The gums were preternaturally red, and in most instances retracted from the teeth and inclined to ooze blood upon pressure. Though in many cases there was complaint of pain in the bones, in none have nodes or the flatness and hardness of the muscles of the calf of the leg, so often described as a peculiarity of marine scurvy, been observed.

Finally, attention should be called to the most prevalent and the most important consequences of the cachexia present, viz., dysentery. Three causes may be assigned, and probably all had an agency in the production of this disease: exposure to rain, with imperfect protection and sleeping on the wet ground; the use of hard limestone water from a well near by, and, lastly, the scorbutic taint. This dysentery is of an acute character, with bloody stools from the beginning, but no typhoid symptoms; it seems to be more of the nature of bloody diarrhœa, easily checked by a laxative followed by an opiate, but soon returning, as might be expected, the causes remaining in full force.

Ass't Surgeon N. B. Sisson reports:—The regiment was moved from the mouth of Coal, on the Kanawha river, in West Virginia, to Carthage, Tenn., by way of Nashville, about the 25th of January, 1863. It consisted of 855 privates and 35 officers, and although it had been in the service a little over five months the health of the men had been such that we had lost but one man from disease; and yet we had been much exposed, had often bivouacked in moving from Marietta, Ohio, to the mouth of New River, in West Virginia, and had done much hard work in building, flooring, roofing, bunking and completing about 60 houses for winter barracks which we had occasion to use. At the time we moved measles and mumps were making their appearance in the regiment. We were transported in three small steamers, the "Cottage," "Victor No. 2" and "Leslie Coombs," with one company on the "Odd-Fellow." These were all old steamers, narrow keels, narrow guards, old models, fueled to run from the mouth of the Kanawha to Nashville and back to Fort Donelson, and carrying ordnance stores, regimental horses and a full supply of tents and camp and garrison equipage. During the two weeks occupied in moving to Nashville the soldiers were so much crowded that food could not be well cooked nor clothing washed or changed; personal cleanliness was impracticable, and the air was impure and poisonous. These insanitary conditions so undermined and debilitated the constitutions of the soldiers that they could not resist or sustain future severe attacks of disease.

Having reached Nashville, the regiment encamped three miles south of the city, during rainy weather, in old and leaky tents, with cases of measles occurring daily until the number ran up to 80. These were left in hospital at Nashville after having remained in camp thirteen days.

After this we were placed on the steamers "Fitzhugh" and "Glenwood" for transportation to Carthage, Tenn. On these vessels we were more extremely crowded, for, in addition to the troops, they carried ordnance stores, fuel, tents, camp and garrison equipage and forty mules. Six days were occupied in reaching Carthage, and the crowding was such that some of the companies were compelled to sleep in the hold of the "Fitzhugh." On February 28 the regiment disembarked and marched to a camp two miles south of the Cumberland river and the same distance from Carthage, a sloping piece of ground covered with a large growth of beech trees and apparently a healthy location.

At this time the ration was very defective in variety, there being no potatoes, mixed vegetables, salt, acids, subacid fruits or fresh meat. The ration in the early part of March consisted of hard bread, poor bacon, beans, coffee and sugar; but in a few days rice, salt, tea and molasses were added. Medical Director F. Salter, U. S. Vols., was informed of the necessity of having the regiment supplied at once with fresh meat, potatoes, etc., and was urgently requested to use his influence in having these articles furnished. From day to day and week to week I urged the necessity of fresh meat and a vegetable and anti-scorbutic diet. I stated that the present camp was healthy

and well selected, and that due diligence was given to enforce the laws of military hygiene, as far as in my power, to eradicate the scorbutic and typhoid elements of disease from the command. Thorough cooking, cleanliness, ventilation night and day, striking tents twice a week and oftener when practicable, efficient ditching and draining of tents and camp and daily disinfecting of kitchen-sinks and latrines have been recommended and in a great measure carried into effect. I am informed by the Commissary that during the period Jan. 25, 1863, to June 3 following, he issued about twelve rations of fresh beef. No fresh or desiccated potatoes, mixed vegetables or subacid fruits were issued to the command until the close of May. As soon as weeds and grass began to grow the men were encouraged to procure, cook and use them.

These numerous debilitating causes and elements of disease operating on a regiment unseasoned to the service has made a large sick-list and mortality report. Typhoid fever was developed by crowded transportation and made malignant by the long absence of vegetable diet and the presence of scurvy among the soldiers thus deprived for a long period of proper rations. The scorbutic taint increased the number of diarrhœal cases and made the disease intractable. About 120 cases of measles occurred in the regiment, of which 33 died during the disease or from its effects. There were about 150 cases of typhoid fever, of which 43 died.

This hasty statement is, I believe, correct, and covers most of the causes that have so severely afflicted the regiment and destroyed so many valuable lives. To what extent these causes were avoidable I am not prepared to say; yet it is a great misfortune that scurvy should have affected American troops and given a malignant character to other diseases.

Surgeon JAMES BRYAN, *U. S. Vols., opposite Vicksburg, June* 27, 1863.—Scorbutic diseases in their several forms, without much external development, were not uncommon both among our patients and convalescents. The free use of fresh animal food, together with vegetable acids, acetic, citric and tartaric, was resorted to with advantage in these cases. Sponginess of the gums would sometimes continue a long time after the other symptoms had disappeared.

Surgeon N. W. LEIGHTON, 173*d N. Y., Franklin, La., Feb.* 12, 1864.—Numerous cases of boils and cutaneous eruptions have improved under anti-scorbutic remedies.

Ass't Surgeon HENRY MANFRED, 22*d Ky., Baton Rouge, La., March* 29, 1864.—Several cases of scorbutus occurred from a deficient supply of vegetables and fresh meat. Every effort was made by the medical officers to remedy these deficiencies. Recovery under improved diet and appropriate medical treatment was speedily effected.

Surgeon A. W. GRAY, 24*th Ind., Morganza, La., Sept.* 17, 1864.—The surgeons of the affected regiments are unanimous in the belief that this scorbutic condition is owing to the inhalation for a lengthened period of an atmosphere strongly impregnated with salt, and the entire absence of fresh meat and vegetables from the diet of the men while much exposed to the heat of the sun and doing excessive fatigue duty.

In July and August, 1864, the line of prevalence of scorbutic disease among the white troops became somewhat prominent, although it failed to reach the level of the outbreak in the Army of the Potomac. This increase chiefly affected the forces operating against Atlanta, Ga. These troops constituted only 20 per cent. of the armies then in the field, but they furnished 55 per cent. of the scorbutic cases. Their rate for July amounted to 6.6 cases per thousand of strength. Surgeon H. E. GOODMAN, U. S. Vols., 2d Division, 20th Corps, in his report on the condition of his command during the Atlanta campaign, states that 150 marked cases were admitted to division hospital during the months of July and August, and that during the campaign fifty per cent. of the division, which numbered 7,000 men, had been sent to the rear sick, two-thirds of whom were, in his opinion, suffering from scorbutic affections.* But, on the other hand, Surgeon W. GRINSTEAD, U. S. Vols., of the 3d Division of the same Corps, states that his command did not suffer much, although there was an insufficiency of vegetables.† The number of cases in the Department of Arkansas was at the same time above the average; and a similar increase in the Department of the Gulf prolonged the increased prevalence in the army as a whole into September of that year.

Towards the close of the year ending June 30, 1865, a slight increase in the number of scorbutic cases was mainly due to conditions affecting the diet of the troops in the Central region. No special reports relating to these outbreaks are on file.

The annual rates of prevalence, calculated from the cases reported by medical officers of white troops during the four years of the war and the year following the war, were:

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* See the *Report*, p. 3-7, Part First of this work.

† *Ibid*, page 309.

	Per 1,000 of strength.
For the year ending June 30, 1862	4.7
For the year ending June 30, 1863	12.6
For the year ending June 30, 1864	9.6
For the year ending June 30, 1865	22.4
For the year ending June 30, 1866	28.5
Average annual rate from the statistics of the five years	13.8

But the prevalence of the disease among these troops will be better appreciated by a reference to the diagram facing this page, on which it is represented by the light red line. The maximum during the war, 4.0 per 1,000 in July, 1862, was occasioned by the outbreak in the Army of the Potomac. At that time this army, which constituted only 25 per cent. of the forces in the field, furnished 68 per cent. of the reported cases. The maximum monthly rate, shown by its reports, was 10.7 per 1,000 men.

The unexpected demonstration of a more extensively diffused scorbutic taint among the white troops in the year following the war than at any time during its progress must be referred to the conditions attending the disbanding of large masses of men, and especially to carelessness on the part of officers and men whose thoughts were perhaps engaged on their own future plans rather than on current affairs. The monthly rate of 5.6 was recorded towards the end of the spring of 1866, when the return of vegetation repressed the epidemic tendency.*

The same diagram illustrates, by means of the heavy red line, the prevalence of the disease among the colored troops of the army, while the orange and green lines submit for comparison the monthly rates that prevailed in the British and French armies in 1854–56, during the Crimean campaign.

Scurvy had a much greater prevalence and fatality among the colored than among the white troops. During the three years covered by the statistics 16,217 cases and 338 deaths were recorded,—equivalent to an annual average rate of 88.8 per thousand of strength, with 2.08 per cent. of the cases terminating fatally. The rates were:

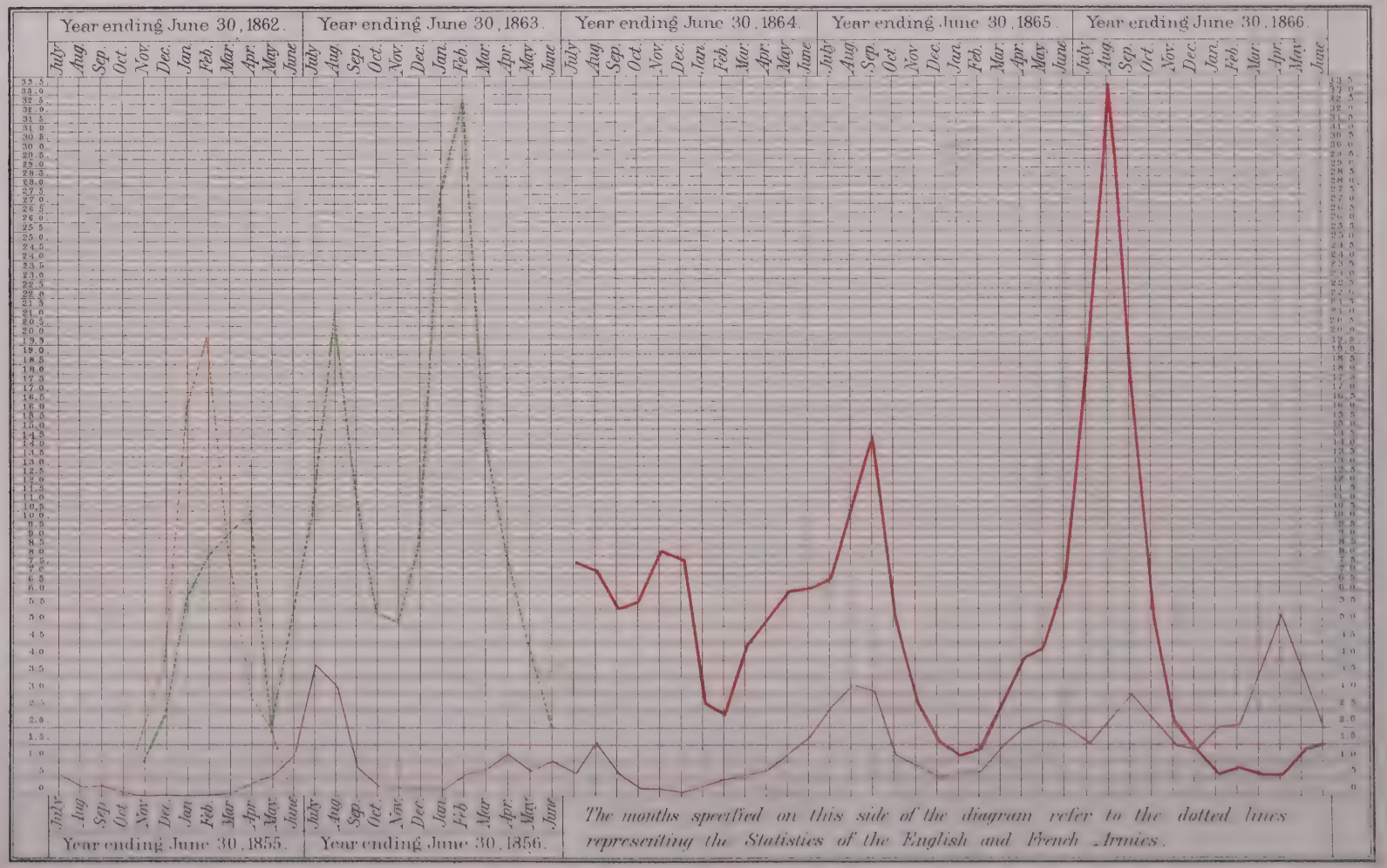
	Per 1,000 of strength.
For the year ending June 30, 1864	68.0
For the year ending June 30, 1865	65.1
For the year ending June 30, 1866	141.6

The causes which increased the prevalence among the white troops in the summer of 1864 and in the summer and autumn of 1865 appear to have operated with great intensity on the colored troops. In August of the latter year the monthly rate, 33.9, was higher than the maximum attained by the disease in the French ranks, 32.9, in February, 1856. Even in July, 1863, the first month for which returns were received, and when only 12,000

* During the fiscal years 1866–67 and 1867–68 the rate of scurvy continued higher in the U. S. Army than it had been during the years of the war. In the former year the rate was 25.9—in the latter 21.1—among the white troops per thousand of strength. This was undoubtedly owing to the re-establishment of those conditions already indicated as having been in existence before the war,—the garrisoning of military posts in localities remote from vegetable markets and other sources of food supplies. The following, from a report on the condition of Fort Stevenson, Dakota, by Ass't Surgeon Washington Matthews, U. S. A., published in Circular No. 4, War Department, Surgeon General's Office, Washington, D. C., December, 1870, p. 396, shows the prevalence of scurvy at that post, and, as this is not an isolated instance, the high rate of scurvy in the army during those years is readily understood:—"During the summer of 1867 the Sioux made three raids on the camp in force and one attack in a small party. The troops were compelled to labor very hard after the building of the post was commenced, and as their food was deficient in variety, and being lodged in tents during the severest weather, they suffered greatly in health. Acute dysentery was the first prevailing disease. This reached its height in September, 1867, when there were some fifty-five cases on the report, besides a number of mild attacks not recorded. After this scurvy prevailed. This reached its height in April, 1868, during which month there were sixty-one cases reported among the enlisted men alone, besides forty or fifty able to perform light or partial duty, whose names were not taken upon the sick-list. The scorbutic taint was, however, even more widespread than these numbers would seem to indicate. The men were prone to contract diseases, slow to recover and little able to bear their hard labors and the rigors of the climate; frost-bites were common. The troops were not completely housed until Jan. 3, 1868." In the mean time the lessons of the war were not forgotten by medical and company officers and post commanders. Efforts were made to raise such vegetables as were adapted to grow in the soil of the garrisoned localities; and at posts where the soil was arid and sterile a larger allowance of flour or bread was authorized to admit of the purchase of articles to vary the diet by means of the money-value of the unconsumed portions of the ration. In September, 1867, the Subsistence Department was required to keep on hand liberal supplies of canned fruits and vegetables for sale to officers for their personal use and company messes. The effect of these measures was seen in the year 1868–69 in the reduction of the annual rate of scurvy to 4.8 per thousand of strength. Since that time the disease has been practically excluded from

Diagram showing the Prevalence of Scurvy among the White and Colored Troops of the United States during the War of the Rebellion, and in the English and French Armies during the Crimean War.

U.S. White Troops. *U.S. Colored Troops.* *English Army.* *French Army.*


Year ending June 30, 1862.
Year ending June 30, 1863.
Year ending June 30, 1864.
Year ending June 30, 1865.
Year ending June 30, 1866.
July Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June
Year ending June 30, 1855.
Year ending June 30, 1856.
The months specified on this side of the diagram refer to the dotted lines representing the Statistics of the English and French Armies.

men had been enrolled, the rate of scurvy was 7.7 per thousand, or nearly double the rate of the white troops when the epidemic in the Army of the Potomac raised it to its maximum. From this a cachectic condition must be inferred as having been in existence at the time of their enlistment: and this seems the more likely when it is considered that most of them had endured many hardships in those disturbed times before their admission into the service gave them a position and resources. The tendency of the colored men to succumb under morbific influences, a reference to which has already been made,* might be suggested in explanation of the extension of scorbutic disease among them, and the remarks of Surgeon H. W. Brown, 4th Corps D'Afrique, submitted below, might be cited in support of this view: but this is manifestly inconsistent with the fact that during the last half of the year ending June 30, 1866, the number of scorbutics in the colored ranks was relatively less than among the white troops. The very great prevalence at the period mentioned must therefore be attributed to a deficient dietary operating on the system of a race having perhaps a special predisposition to be harmfully affected by the deficiency. Unfortunately the only special reports on this subject, two in number, relate to a period when the general rate of scurvy was nearly at its minimum.

Surgeon **H. W. Brown**, *4th Corps D'Afrique, Port Hudson, La., April* 5, 1864.—**There is a kind of scorbutic taint, a want of vitality, which seems to belong to the negro, and is observed in him both in and out of the military service.** It manifests itself in soft and swollen gums, tumid bellies and offensive breath. The swelled belly is found mostly among the contrabands and in their children: but the negro soldier is constantly applying to the surgeon for alum for a sore mouth. These appearances are frequent when scurvy cannot be said to exist as a disease. Diet—that is to say, a proper diet and constantly supplied—would, perhaps, remedy this: as it is, the tendency no doubt has a great **influence upon the cause and termination of inflammatory complaints.**

Surgeon **John Fish**, *17th Corps D'Afrique, Port Hudson, La., Feb.* 25, 1864.—**Scurvy certainly exists, but is generally associated with and masked by other diseases.** It works insidiously, and while few are attacked with uncomplicated scurvy, the constitutions of many are so undermined that they yield with scarcely a struggle to the quick onset of more open foes, such as pneumonia and other acute diseases. My slender experience inclines me to think that scurvy **often palms itself off upon the surgeon for chronic rheumatism. At any rate I am treating some cases of chronic rheumatism (!) with chlorate of potash, iron and Irish potatoes.**

Surgeon S. Hemenway, 41st Colored Troops, has placed on record some interesting particulars concerning the epidemic in the 25th Army Corps,† which, in the months of July, August and September, 1865, raised the rate of prevalence of scurvy among the colored troops to 19.7, 33.9 and 18.3 per thousand of strength. These troops had been engaged during the previous winter in the operations against Richmond and Petersburg, Va. Supplies of fresh vegetables had been exceedingly limited, and it is said that the articles of the regular ration—the pork, hard bread, beans and rice—had not always been in good condition when issued. Fatigue duty was arduous and continued, fuel insufficient, and the quarters of the men dark, damp and cold. Many became despondent and would not exert themselves to improve their condition. Distinctly marked cases of scurvy had already appeared in May, 1865, while the corps was at City Point, Va., and many medical officers, in reviewing their practice at this time by the light of their subsequent experience in Texas, concluded that cases which they had reported as rheumatism had been in fact manifestations of scor-

the service, the army surgeon has the most right to know. Exceptional cases have occurred in instances of individual privation, sometimes the result of [illegible] position on the part of the man to make use of the available vegetable supplies. **The extension of railroad transportation and the material increase of the canned-goods trade have contributed largely to remove the taint of scurvy from the military service of the United States. The introduction of steam into the navy, by shortening the voyage from port to port, the use of fresh provisions while in port and the issue of a ration of six ounces of canned vegetables twice a week when fresh vegetables are not available, have banished scurvy from the navy under the ordinary conditions of service.** The disease was imported by Dr. Gray in 1858 on the *Idaho* during a voyage which lasted two hundred days. Few of the men sought sick quarters, but their general condition was below par; they performed their duties listlessly; they lost strength and appetite; their bodies were covered with [illegible]; their gums were tender and bled easily, causing those who chewed to attribute it to the tobacco, for which they lost taste; scratches, if such had been received, healed slowly or not at all; and men, often of the finest physique, succumbed readily to trifling causes of disease. (See *Practical Suggestions on Naval Hygiene*, by **Albert L. Gihon**, Surgeon, U. S. Navy, Washington, D. C., 1871, p. 74.)

* Supra, page 14.

† *Chicago Medical Examiner*, Vol. VII, 1866, page 582 *et seq.*

batic disease. During the voyage from City Point, Va., to Brazos St. Iago, Texas, scurvy made rapid progress. As soon as the troops effected a landing at the latter place the worst cases were sent to the post hospital, at which, within a week, five hundred cases had accumulated. Two or three hundred, for whom no hospital accommodation could be procured, were sent to New Orleans, La., but this relief was only temporary, for within three days the patients at the post hospital again largely exceeded the accommodations. About sixty per cent. of the corps suffered from the disease. Most of the cases had to be treated in quarters. As soon, however, as the troops moved into the interior and fresh vegetables, even in limited quantities, were obtained, the disease began to decline.

A debilitated state of the system with emaciation characterized the disease, particularly in cases accompanied by diarrhœal or dysenteric discharges. Extensive ulcerations of the gums with frequent bleeding were universally present. The swollen gums projected in the form of bulbous enlargements of a dark-red or purplish and often of a perfectly black color. These sometimes completely hid the lateral view of the molar, bicuspid and canine teeth. Extensive ecchymoses on the extremities and other portions of the body and a dropsical condition of the feet and legs were attended with severe pains in the joints and bones of the lower extremities. Vesications and foul ulcerations were also frequently present. The muscles of the calf and thigh were often indurated, and the joints, particularly the knee and ankle, anchylosed. The patients were usually much dejected, and death ensued after muscular exertion, from hemorrhage during the process of digestion and sometimes from pulmonary œdema. Dr. HEMENWAY used with some degree of satisfaction the juice of the *Agave Americana;* but he did not feel warranted in affirming that the good results depended entirely upon this remedy, for most of the scorbutic patients were supplied at the same time with small allowances of raw potatoes and onions sliced in vinegar, and pickled cabbage—and when thus supplied improvement was always more rapidly effected.

The greater prevalence of scurvy among the soldiers of the Confederate armies and the prisoners of war on both sides than among the United States troops in active service has already been indicated.*

The CLINICAL RECORDS of scurvy are exceedingly meagre. The case-books of the general hospitals contain notes of only seventeen cases in which the disease occurred in United States soldiers while on duty with their commands; 1–11 are from the records of the hospital at Quincy, Ill.:

CASE 1.—Private John Geisbühler, Co. H, 82d Ill.; age 38; was admitted July 9, 1864, from Jefferson Barracks, Mo., having suffered more or less from scurvy for five months. He was emaciated and had purple spots on the right leg. Gave nitric acid, sour krout, fresh vegetables and full diet. He improved for the first few weeks of his stay, but after this there was only a very gradual change in the swollen limb. On October 1 it was still considerably enlarged and the patient had lost some teeth. He was discharged from the service Feb. 8, 1865.

CASE 2.—Private Peter Reynolds, Co. H, 84th Ill.; age 27; was admitted July 27, 1864, from Jefferson Barracks, Mo., where he had been treated for a month for scurvy. He was feeble and his legs were swollen and covered with livid spots. Gave cinchona, sulphate of iron and anti-scorbutic diet. Improvement was slowly effected. He was discharged March 29, 1865.

CASE 3.—Private Dennis Crowley, Co. I, 96th Ill.; age 21; admitted July 27, 1864, from Jefferson Barracks, Mo., having been somewhat troubled with scurvy for two months. His left foot and leg were swollen, discolored and ulcerated. He was treated with special diet and vegetable acids, but improvement was not rapid. In November there was still some swelling of the leg, although the patient was able to do duty not requiring activity or strength. He suffered from palpitation in going up stairs or in making any special exertion. On Feb. 13, 1865, he was transferred to the Veteran Reserve Corps.

CASE 4.—Private James Blair, Co. A, 34th Ill.; age 28; was admitted Aug. 17, 1864, from Jefferson Barracks, Mo., with chronic rheumatism. He had pain in all the large joints; the gums were almost totally destroyed and the roots of the teeth carious. Colchicum was given with a mouth-wash of chlorate of potash. In about three months, during half of which period he was on furlough, the rheumatic pains were relieved, but, as he was unable to eat solid food, he was discharged from the service Jan. 26, 1865.

CASE 5.—Corp'l Thomas Lennard, Co. I, 39th Iowa; age 49; was admitted Sept. 25, 1863, with scurvy. Body emaciated; skin livid; purplish spots on legs; gums spongy and bleeding; feet and ankles somewhat œdematous; pulse and appetite normal. Gave lemonade and fresh vegetables. October 20: Constant pain in large joints. November 20: Gave guaiacum and iodide of potassium. Scurvy better; rheumatism better. December 25: Skin free from discoloration; pains in hip and knee joints. Jan. 10, 1864: Scorbutic symptoms returning; gums swollen and bleeding; severe pain in back; appetite poor,—inability to eat animal food. 25: Iodide of potassium discontinued.

* See *supra*, pp. 37, 40, 49, 51, 52, 54, 55, 58, 60, 61, 64 and 67 *et seq.*

Gave nitric acid three times a day. February 10: No improvement; patient cannot walk without crutches. Discharged from service on the 25th.

CASE 6.—Serg't Andrew Allen, Co. H, 31st Wis.; age 31; was admitted Nov. 25, 1864, having been sick since the 1st with scurvy and diarrhœa. He was weak and emaciated and had pains in his legs, which were rough and covered with reddish spots. He was treated with citric acid, vegetable diet and, subsequently, a furlough, and was returned to duty Feb. 6, 1865.

CASE 7.—Private Henry P. Brush, Co. H, 30th Wis.; age 39; was admitted Nov. 25, 1864, with scurvy, having had chills and fever about the 1st, followed in a few days by fever and pain in both legs, the skin of which was dry and showed some yellow spots. The patient was weak and emaciated; his gums spongy; appetite moderate. Tonics, vegetable diet and a furlough enabled him to be returned to duty Feb. 6, 1865.

CASE 8.—Private Robert R. Davidson, Co. H, 30th Wis.; age 45; was admitted Nov. 25, 1864, with pain in the legs and swollen gums, loss of appetite and debilitating night-sweats. Under the use of tonics and a plentiful vegetable diet he gradually gained strength and was returned to duty Feb. 26, 1865.

CASE 9.—Private Chester Tuttle, Co. H, 30th Wis.; age 45; was admitted Nov. 25, 1864, with scurvy. He had been attacked with diarrhœa, soreness of the gums and pains in the legs about three months before admission. His gums were spongy and the surface of his legs hot, dry and purplish. He was returned to duty April 1, after a course of tonics, vegetable acids and appropriate diet.

CASE 10.—Private Nelson Peterson, Co. D, 30th Wis.; age 38; was admitted Nov. 26, 1864, with scurvy. He had suffered occasionally from fever and diarrhœa for six months prior to admission. His legs were painful and spotted and his gums red and spongy. Vegetable acids and a suitable diet were prescribed. Subsequently he was furloughed and had an attack of pneumonia while at home. On April 3 he was transferred to Madison, Wis.

CASE 11.—Corp'l Jacob Stotts, Co. K, 1st Mo. Eng'rs; age 39; admitted Dec. 8, 1864. His legs were painful, tender and covered with purplish spots; his gums tender and swollen. He was emaciated and weak and had a diarrhœa of three or four stools daily. Vegetable acids, chlorate of potassa, turpentine emulsion and pills of nitrate of silver and opium were prescribed; sulphate of copper and opium were subsequently employed, but improvement was slow and the patient was discharged April 4, 1865.

CASE 12.—Private Lewis Harry, Co. I, 147th Pa.; age 24; was admitted May 19, 1864, with scurvy. His mouth was much inflamed. Jellies, potato salad and lemonade were prescribed; also a teaspoonful every three hours of a solution containing forty grains of chlorate of potash in an ounce of water. A gargle of chlorate of potash, tincture of myrrh and water was used at first, and afterwards a lotion containing six grains of nitrate of silver in an ounce of water. He was returned to duty July 10.—*South Street Hospital, Philadelphia, Pa.*

CASE 13.—Private Emmanuel Brooks, Co. A, 122d Pa., was admitted Oct. 5, 1862, having been sick for a month in camp with scurvy. He had pain in his back, which was habitually bent forward; the joints of his extremities were painful but not tender, red nor swollen; the muscles, especially of the lower limbs, were tender, painful and affected with frequent cramps. He had no fever; his appetite was good and bowels regular. He was discharged Feb. 12, 1863, on account of disease of the spine.—*Ladies' Home Hospital, New York.*

CASE 14.—Private Edwin R. Jeffries, Co. A, 122d Pa., was admitted Oct. 5, 1862. He had enlisted August 11 and served with the Army of the Potomac, but after the latter part of this month he was taken with a fever which lasted about eight days. Following this he had pain in the back and the extremities, particularly on both sides of the spinous processes and in the muscles of the lower extremities. His appetite was good, bowels regular and he had no fever. His body was habitually bent forward. Sulphate of quinine in small doses and afterwards citrate of iron and quinia were administered, with dry cups to the back and stimulating liniments to the limbs. He was discharged from service Feb. 12, 1863, because of disease of the spine.—*Ladies' Home Hospital, New York.*

CASE 15.—Sergeant David V. Whurry, Co. G, 23d Ohio, had been confined to bed with fever for a week about the middle of September, 1862, in Washington, D. C., prior to which he had suffered from pain in the back, but had been able to do duty. Subsequently he had four intermittent paroxysms of the quartan type. He was admitted October 5 with marked tenderness over the dorsal and lumbar vertebræ and tenderness of the muscles of the extremities, but with no cramps, swelling or tenderness of the joints and no fever; his appetite and digestion were good. He improved somewhat under the treatment pursued in the two cases just recorded, and was discharged from service March 21, 1863, because of anterior spinal curvature.—*Ladies' Home Hospital, New York.**

CASE 16.—Corporal William A. Morris, Co. H, 29th Mo.; age 32; had a severe attack of scurvy in August, 1864, by which he lost seventeen teeth. On admission from Baltimore, Md., Feb. 23, 1865, he was convalescent. On March 13 he was reported cured; but on April 1 he was taken with small-pox and was left much debilitated and anæmic. He was mustered out of service June 14.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 17.—Private Elihu R. Gillet, Co. D, 37th Wis.; age 38; was admitted July 24, 1864, with debility from miasmatic disease and scurvy. He had a cachectic appearance; pulse 90 and weak: skin somewhat yellow: tongue furred and moist and bowels constipated. On the right side of his mouth was a small hard tumor, which the patient said had existed there for over six months; his gums were livid and swollen. He was treated with rhubarb and magnesia, tincture of iron, stimulants and fresh vegetables. In a day or two the tumor ulcerated and by sloughing

* The singular coincidence of three cases treated in the same hospital at the same time, two of them from the same company of the same regiment, and all presenting the same symptoms, which were generally negative in character, suggests that probably the disease in these instances was nostalgia manifesting itself actively in a desire for discharge.

formed a sore an inch in diameter. The application of bromine caused the surface of the ulcer to assume a healthier appearance, but the general condition of the patient did not improve; he became weak, restless and ultimately delirious. He died August 10. In a note appended to this case Ass't Surgeon HARRISON ALLEN, U. S. A., says:—I believe this to have been a scorbutic ulcer subsequently complicated by phagedenic sloughing. Bromine did not have the same beneficial effect observed in its application upon the phagedena of wounds. The fauces and pharynx were free from ulceration. The body decomposed so rapidly that no examination was made after death.—*Fairfax Seminary Hospital, Va.*

The case-books present in addition ten cases in which the patients were either rebel prisoners or Union soldiers who had contracted the disease while in the hands of the enemy:

CASE 18.—Private John S. Farthing, Co. C, 37th N. C., was admitted July 21, 1863, with scurvy. He was weak; his gums swollen, spongy and bleeding; teeth denuded; complexion sallow; pulse slow and feeble; bowels loose. Under the use of two lemons daily, a teaspoonful of lemon-juice and ten grains of iodide of potassium three times a day and pills of opium and camphor, he was much improved by the end of two weeks, and on August 8 was transferred to the Provost Marshal's bureau.—*West Walnut Street Hospital, Harrisburg, Pa.*

CASE 19.—During the invasion of Pennsylvania in 1863 private Joseph King, Co. C, 11th N. C., was in the Winder hospital, Richmond, under treatment for scorbutic diarrhœa. When partially recovered he was ordered with four hundred convalescents to join his regiment at Hagerstown, Md. He was transported by rail to Staunton, Va., marched thence to Hagerstown, and was placed in hospital at Chambersburg, where he was captured. On August 4, when he reached this hospital, he was much debilitated, having fever every evening and an exhausting diarrhœa. The fever was controlled by fifteen grains of quinine every morning for three days and brandy, morphine, camphor and veratrum viride at intervals. He convalesced rapidly under tonics, anti-scorbutics and a suitable diet, and was returned to the Provost Marshal's care October 28.—*West Walnut Street Hospital, Harrisburg, Pa.*

CASE 20.—Private John Haggerty, Co. A, 173d N. Y.; age 40; contracted scurvy while in a rebel prison, and several months afterwards, June 17, 1865, was admitted into hospital. His joints were stiff and his gums spongy and bleeding. He was treated with vegetable diet and strong lemonade. He was discharged from service September 12.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 21.—Private Nathan Raynor, Co. C, 165th N. Y.; age 33; was admitted June 17, 1865, having suffered more or less from scurvy since April, 1864, when he was a prisoner in Texas. His gums were swollen and painful and he had a scorbutic ulcer on the left leg, but his health was otherwise good. He was treated with lemonade. On the 26th he was transferred to McDougall hospital in New York City.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 22.—Private J. J. Snyder, Co. I, 97th N. Y.; age 37; was struck on the back with a musket at the battle of the Rapidan, Oct. 15, 1863. This paralyzed his lower limbs and caused him to be taken prisoner. He was carried to Richmond, where, in the course of a week, he began to be affected with incontinence of urine, hæmaturia and pain in the back and left side. At a later date he contracted scurvy. On April 18, 1864, he was admitted to Jarvis hospital, Baltimore,—diagnosis, quinsy; furloughed June 15; returned July 9; transferred to hospital, Annapolis, Md., on the 12th,—diagnosis, bronchitis; sent to Camp Parole hospital, near Alexandria, on the 18th,—diagnosis, gangrenous ulcer; returned to Jarvis hospital October 12; transferred to this hospital on the 22d; furloughed November 4, returned on the 24th; transferred to Invalid Corps because of debility from scurvy May 6, 1865. On November 24 he was free from all trace of scurvy and able to dispense with the use of crutches.—*Chester Hospital, Pa.*

CASE 23.—Private Jacob Strickler, Co. H, 25th Va. (rebel), was admitted Aug. 10, 1863. On the 18th he was in a low condition with feeble pulse, blood oozing from the gums and a diarrhœa of twenty to thirty stools daily. He was treated with aromatic sulphuric acid and raw onions. At the end of two weeks the diarrhœa was checked and the patient transferred to Point Lookout, Md., where he arrived on October 4,—diagnosis, chronic diarrhœa. He was exchanged March 17, 1864.—*Chester Hospital, Pa.*

CASE 24.—Private Isaac Rosa, Co. G, 89th Ill.; age 35; was captured at Chickamauga, Ga., Sept. 20, 1863, confined two months at Richmond and five months at Danville, where he contracted scurvy. On admission to hospital, June 7, 1864, he had œdema of the left foot, leg and thigh; his gums bled easily and his teeth were quite loose. Small doses of citric acid and quinine were given frequently, with a free supply of grated raw potatoes, and afterwards two ounces of lime-juice three times a day. He was improving when, on July 12, he was transferred to hospital at Annapolis, Md.—*Annapolis Junction Hospital, Md.*

CASE 25.—Sergeant Charles Bramfels, Co. F, 16th Ill. Cav.; age 30; was captured at Jonesville, Va., Jan. 3, 1864, and carried to Belle Isle, Va. He was paroled May 2 and admitted to hospital June 7. He had been under treatment in Richmond for ten weeks on account of scorbutic ulcers which yet remained unhealed. They persisted notwithstanding the use of various local applications—stimulating, astringent and soothing. He was furloughed August 8, the ulcers still unhealed. He returned September 3 and was transferred to Quincy, Ill., on the 26th.—*Annapolis Junction Hospital, Md.*

CASE 26.—Private O. C. Babcock, Co. E, 18th U. S. Inf.; age 35; was captured at Chickamauga Sept. 20, 1863, and confined for six weeks at Richmond and for six months at Danville, where he contracted scurvy through starvation and exposure. It was preceded by diarrhœa, pleurisy and rheumatism. Scorbutic ulcers appeared upon the limbs in many places. He was paroled May 2, 1864, and when admitted to hospital, June 7, was so weak as to be unable to walk. Diarrhœa was easily controlled and his improvement was rapid. On the 28th he was employed on light duty as a nurse and was returned to duty July 19.—*Annapolis Junction Hospital, Md.*

CASE 27.—Private Joshua Helton, Co. D, 54th Va., admitted Nov. 26, 1864; returned to barracks Feb. 28, 1865. He stated on admission that he had been a prisoner of war at this place for six months, during which he never had vegetables. Two weeks before admission he experienced acute pain on moving the right leg, which rapidly became swollen from the knee to the heel and spotted with dark-purple patches; the thigh also was slightly swollen and discolored on its inner aspect; the gums were somewhat tender and coated with accumulated tartar. The respiratory and digestive organs appeared to be sound.—*Rock Island Hospital, Ill.*

Of 12,000 medical descriptive lists on file in this office only 176 refer to scorbutic attacks. One hundred and sixteen of these were forwarded from two hospitals in Maryland.—58 each from the general hospital at Annapolis and the Hammond hospital at Point Lookout. The patients treated in the former were Union soldiers transferred from rebel prisons by parole or exchange: 19 of these died and 39 recovered. Those treated in the latter establishment were mostly Confederate soldiers from the neighboring prison camps; of these 21 died and 37 recovered. The following selections are submitted as illustrating fully the general character of the information furnished by these reports.

CASE 28.—Private Thomas W. Travis, Co. H, 44th Ill.; age 21; was admitted Dec. 17, 1864, with scurvy, direct from Savannah, Ga. He improved rapidly on a vegetable diet, and in the course of a week was placed upon light duty as a nurse. He was returned to duty Jan. 17, 1865.

CASE 29.—Private Andrew Brown, Co. B, 77th N. Y.; age 20; was admitted Dec. 4, 1864, with scurvy contracted while a prisoner at Andersonville. He recovered under proper diet and was furloughed Jan. 20, 1865.

CASE 30.—Corporal Ransom Dodge, Co. K, 11th N. Y. Cav.; age 30; was admitted April 9, 1864, with scurvy contracted while in prison at Belle Isle, Va., after his capture at Edwards Ferry, Aug. 28, 1863. He was much debilitated, his respiration labored on account of peritoneal effusion and the action of the heart also somewhat embarrassed. In addition he had a persistent and weakening relaxation of the bowels, which were generally moved three times daily. Citric acid, lemons, lime-juice and onions were freely used in his treatment, with full diet and porter. For a few days bitartrate of potash was tried, but its action was considered too debilitating. He was improving and in a fair way to recovery when, on August 6, he was transferred to New York city.

CASE 31.—Private John Fisher, Co. A, 74th Pa.; age 29; was admitted Nov. 18, 1863. His skin was dry and rough, feet œdematous, legs painful, knee-joints stiff, gums tender, appetite lost, bowels relaxed and mind depressed. He was sponged with vinegar and water and directed to take thirty drops of tincture of iron three times a day, with milk-punch, lemonade for a drink and special diet. Later he was directed to have pickles, and camphor and opium was called for on account of the diarrhœal tendency, but withal his condition improved and on Jan. 31, 1864, he was considered convalescent. Meanwhile, however, he began to complain of rheumatic pains in his legs and feet, which were still somewhat œdematous. Ten grains of iodide of potassium were given three times daily, and a liniment containing chloroform and tincture of capsicum was employed. He was returned to duty February 25.

CASE 32.—Private Anderson Green, Co. H, 4th Ky. Mounted Inf., a paroled prisoner; age 20; was admitted Dec. 17, 1864, with scurvy and chronic diarrhœa. His lower limbs were dropsical and he was so weak as to be unable to rise from bed; he had a frequent diarrhœa, light-colored and frothy. He was treated with astringents, generous diet and brandy, but the diarrhœa persisted and on Jan. 19, 1865, the stools were passed involuntarily. He died on the 21st.

CASE 33.—Corporal William Reed, Co. K, 162d N. Y.; age 31; was admitted Oct. 29, 1863, from Belle Isle, Va., where he had been imprisoned from the time of his capture at Springfield Landing, July 2, 1863. He was much emaciated and weakened by diarrhœa and had several large ulcers on different parts of the body; his pulse was feeble and frequent and he had little or no appetite. Charcoal and yeast poultices were applied to the ulcers and stimulants and tonics were administered, with a free vegetable diet, but the patient gradually failed, dying November 22.

CASE 34.—Private Edward Dwyer, Co. F, 104th N. Y.; age 35; was admitted March 11, 1865, with scurvy and general debility. Chlorinated washes were prescribed for the mouth and throat; tonics and stimulants were administered with an appropriate diet; but the patient was in a hopeless condition. He died on the 17th.

CASE 35.—Private M. W. White, Co. I, 25th Ill., a paroled prisoner from Andersonville; age 24; was admitted Dec. 4, 1864, much emaciated and weak from scurvy and a diarrhœa of twelve or fifteen passages daily. Astringents and antiscorbutics were freely used, but for a week the patient's condition remained unchanged except for the development of a chill and fever every afternoon. Quinine and stimulants were administered. On the 10th the alvine discharges became increased in frequency, mixed with blood and associated with great thirst, increasing prostration and much abdominal pain. The stools were passed involuntarily on the 13th, and death took place next day.

CASE 36.—Private A. J. Green, Co. I, 51st Ga.; age 28; was admitted Oct. 26, 1863, from the hospital at the prisoners' camp, complaining of weakness and soreness in the legs from scurvy, although otherwise in fair condition. He improved rapidly on tincture of iron and full diet. On November 5 he was considered cured. He was transferred for exchange March 17, 1864.

CASE 37.—Private J. M. Gallava, Co. A, 12th S. C.; age 22; was admitted Oct. 4, 1863, as a sergeant who had suffered more or less with diarrhœa since May. On October 20 he was reported much improved, having been taking diluted sulphuric acid and special diet. He was returned to prisoners' camp Jan. 12, 1864.

CASE 38.—Private A. Robinson, Co. C, 30th N. C.; age 22; was admitted without a record of his previous history, Nov. 8, 1863. The posterior and inner aspect of the right thigh and the calf of the right leg were extensively discolored with purple spots. Tincture of iodine was applied externally and chlorate of potash prescribed for internal use; full diet was ordered. On the 20th the spots had disappeared and the patient was nearly well, but there remained some dropsical swelling of the foot and leg for which a mixture of squill, buchu and sweet spirit of nitre was administered. On March 3, 1864, he was sent to City Point for exchange.

CASE 39.—Private Jacob Jenkins, Co. A, 11th N. C.; age 20; was admitted Oct. 27, 1863, with an acute bronchitic attack, but he had been scorbutic for several months. He was treated with tartar emetic and opium, blue-pill and Dover's powder, with blisters to the chest, whiskey, citrate of iron and quinine and special diet. By December 16 the chest affection was entirely relieved, but there was much debility and occasional diarrhœa from the scorbutic condition. No decided improvement in this respect was manifested up to the time of his exchange, March 17, 1864.

CASE 40.—Private D. F. Eddleman, Co. H, 52d N. C.; age 33; was admitted Oct. 27, 1863, having been affected for five months with scurvy and frequent attacks of diarrhœa. Under treatment and extra diet the diarrhœa was controlled, but the gums and teeth remained in an unhealthy condition, the former swollen and disposed to bleed, the latter decayed and loose in their sockets; one loose tooth had to be removed. He continued, however, to improve slowly and on Jan. 12, 1864, was returned to camp.

CASE 41.—Private Forney Avery, Co. E, 4th N. C.; age 38; was admitted Nov. 6, 1863, with chronic diarrhœa. His gums were of a deep dark-red color and spongy, but there were no scorbutic ecchymoses or ulcerations. He was treated with vegetable diet, lemonade, potato salad and astringents. The diarrhœa persisted, causing seven or eight stools daily, until death took place on the 21st.

CASE 42.—Private W. H. Crickman, Co. C, 1st N. C.; age 28; was admitted Oct. 22, 1863, with scurvy. He was placed on tincture of iron and appropriate diet, and was showing signs of improvement when, on November 3, an active and exhausting diarrhœa supervened. This was somewhat controlled by the 8th, but the patient was very weak and had no appetite. Pneumonic symptoms were noted on the 20th, and death took place on the 23d.

CASE 43.—Private D. Dukes, Co. H, 61st Va.; age 22; was admitted Nov. 10, 1863, with a diarrhœa of four months' continuance and scurvy manifested in his swollen and tender gums. He was weak and much emaciated but had no cutaneous discolorations. Special diet was prescribed, with sulphate of iron, opium and alcoholic stimulants. The diarrhœa became aggravated and the patient proportionately debilitated; ten to fifteen passages from the bowels were recorded daily, until he died on the 21st.

CASE 44.—Private Thomas Logan, Co. I, 117th N. Y.; age 24; was admitted March 13, 1865, with typhoid fever, and died on the 24th. He had been confined in Southern prisons and fed on corn meal and sorghum molasses. He was very scorbutic and had suffered from chronic dysentery before the supervention of the fever. Turpentine emulsion, sweet spirit of nitre, morphia occasionally and persulphate of iron were prescribed. Great care was exercised in giving suitable nourishment and in having perfect ventilation of the tent-ward in which he was treated. Act. Ass't Surgeon JOHN FEE remarks on this case as follows: It was a noticeable fact that all the returned prisoners who were scorbutic suffered from diarrhœa, and that the grave condition of the bowels was indicated by the odor and color of the stools and the presence of blood and mucus in them. Typhoid fever supervening in these cases was sure soon to terminate fatally.

POST-MORTEM OBSERVATIONS.—Few records of *post-mortem* examinations in cases of scurvy have been preserved. Scorbutic symptoms were present in twenty-one of the cases already submitted as illustrations of the diarrhœal diseases that prevailed among the troops; but twelve of these, 229, 232, 234, 235, 626, 638, 640, 641, 657, 663, 667 and 681, occurred in the persons of rebel prisoners treated in the hospitals at Point Lookout, Md., and Rock Island, Ill., and in three, 222, 223 and 251, the patients were Union soldiers recently returned from Southern prisons;—thus in only six of these cases, 111, 144, 158, 166, 187 and 798, does the diseased condition appear to have originated in men while on active service with their commands. Two of the cases illustrating the *post-mortem* appearances of the continued-fever cases were associated with scurvy, and in both of these the patients had suffered imprisonment in the South. In addition to these the following have been gathered from the case-books and medical descriptive lists:

CASE 45.—Private Christopher Frey, 13th N. Y. Bat'y, was admitted Aug. 11, 1864, and died on the same day. He had much aching in the bones and an exhausting diarrhœa, the stools occurring every twenty minutes. His gums were swollen and bled on the slightest pressure, and there were large dark-colored spots on his lower extremities; his pulse was weak but not frequent; breathing quick and somewhat difficult; tongue dry in the centre but moist at the edges. *Post-mortem* examination: Congestion of the entire body.—*Second Division Hospital, Twentieth Corps.*

CASE 46.—Private Andrew Garrett, Co. A, 16th Colored Troops; age 38; was admitted Aug. 21, 1864, from the field with scurvy and general debility. He died on the 27th. *Post-mortem* examination: Lungs much congested;

left lung adherent universally; pericardium containing eight ounces of serum; heart, weighing eighteen ounces, pale and flabby; abdominal viscera normal.—*Chattanooga Field Hospital, Tenn.*

Case 47.—Private Isaiah Stoner, Co. H, 16th Colored Troops; age 21; was admitted Aug. 23, 1864, from the field with scurvy. Died September 14. *Post-mortem* examination: There were pleuritic adhesions on both sides; the lower lobe of the right lung was gangrenous and the other lobes congested; the left lung was normal. The remaining viscera were healthy.—*Chattanooga Field Hospital, Tenn.*

Case 48.—Private C. H. Smith, Co. C, 4th N. H.; age 31; was admitted Sept. 28, 1863, with scurvy. He was emaciated, greatly debilitated and had tumors and ulcers on his legs and hips; his tongue was moist and slightly coated; bowels regular. Tincture of iron and special diet were prescribed. On November 1 the following note was made: The condition of the blood of this patient is improving since his ulcers have healed, but there is evidently disease of the lungs; he has a dry teasing cough, flatness, puerile respiration and humid râles. On the 26th the lung trouble was reported aggravated, the legs œdematous, the patient affected with diarrhœa and extremely prostrated. He died on the 29th. *Post-mortem* examination: Extensive tuberculous disease of both lungs in all stages, hard, soft and excavated.—*Act. Ass't Surgeon Charles T. Reber, General Hospital No. 14, Beaufort, S. C.*

Case 49.—Private Enoch Green, Co. I, 27th Miss., was admitted Nov. 1, 1864, with scurvy, and died Jan. 27, 1865. *Post-mortem* examination: Both lungs were adherent and filled with tubercle. The liver and spleen were healthy but somewhat enlarged. The bowels were slightly congested and the mesenteric glands enlarged. No other abnormal appearance was observed.—*Act. Ass't Surgeon H. H. Russell, Rock Island, Ill.*

Case 50.—Private Philo B. Weaver, Co. K, 67th Ohio; age 20; was admitted from Richmond, Va., April 18, 1864, with scurvy and dropsy, and died May 7. *Post-mortem* examination: The right lung was congested; the left tuberculous. The heart was small and flabby. The peritoneum contained three quarts of thin pus and the intestines were extensively congested. The spleen was soft; the liver hard; the kidneys natural.—*Act. Ass't Surgeon B. B. Miles, Jarvis Hospital, Baltimore, Md.*

Case 51.—Private M. H. Kindred, Co. E, 1st East Tenn.; age 28; was admitted from Richmond, Va., April 18, 1864, with a contusion of the left lung, and died May 11 of purpura hemorrhagica. *Post-mortem* examination: The right pleural cavity contained a quart of bloody effusion and the lung was intensely congested and adherent to the parietes by shreds of soft lymph. The pericardium contained effusion; the heart was flabby. The liver and kidneys were somewhat enlarged and congested; the spleen intensely congested and hard; the mucous coat of the stomach was soft, thickened and ecchymosed; that of the intestine spotted with dark-colored extravasations. The blood was thin, dark-looking and did not coagulate.—*Act. Ass't Surgeon B. B. Miles, Jarvis Hospital, Baltimore, Md.*

Case 52.—Private Noah Davis, Co. C, 8th Colored Troops, was admitted Oct. 29, 1865. He became scorbutic two weeks after landing at Brazos, but accompanied his regiment to Ringgold Barracks, where he went into hospital and took pulque for two weeks, but he did not get well. His gums were red and bled occasionally; his legs became swollen and shortly afterwards ulcerated. Later, diarrhœa was developed; and when, in October, his regiment left to be mustered out, he was sent by steamer to this hospital for treatment. He was somewhat emaciated and so weak as to be confined to bed. He had a diarrhœa of eight to twelve evacuations daily. The patient failed, and died December 7. *Post-mortem* examination: Body emaciated and showing a few scars where the sores had been. The thoracic viscera, liver and pancreas were normal. The stomach contained about ten fluid ounces of greenish liquid. The gall-bladder was empty; the spleen weighed less than two ounces and was of a red color. The kidneys were tough, the pyramids contracted, infundibula and calices enlarged and all of a bright-red color; the bladder contained twelve ounces of urine. The calibre of the last fifteen inches of the ileum was narrowed to three-fourths of an inch; the mucous coat was thickened and red. The caput coli was pale; the ascending colon slightly enlarged; the transverse and descending colon, sigmoid flexure and rectum were contracted to about one inch in diameter and were of a bluish tinge. The mucous membrane of the whole of the canal was examined without detecting ulceration or even much congestion. The mesenteric glands were enlarged,—one-half to two inches long, one-fourth to three-fourths of an inch thick and one-half to one and one-half inches broad,—they felt somewhat like suet to the touch.—*Ass't Surgeon Ira Perry, 9th Colored Troops, Hospital, Brownsville, Texas.*

Probably some of the deaths among paroled prisoners, such as the following at the Jarvis hospital, were in a great measure due to the influence of defective alimentation.

Case 53.—Corp'l William Snyder, Co. H, 13th Pa. Cav.; age 19; was admitted from Richmond, Va., April 18, 1864, with ascites and chronic diarrhœa. He died June 22. *Post-mortem* examination: There was much effusion in the pleural and pericardial cavities. The liver was of a bright-yellow color. The whole of the abdominal viscera were matted together. The kidneys were small and contracted.

Case 54.—Private Frederick Moore, Co. K, 14th Conn.; age 22; was admitted from Richmond, Va., April 18, 1864, with chronic diarrhœa, and died June 2. *Post-mortem* examination: The right lung was atrophied and bound down by adhesions; the left pleural sac contained effusion and the lung was hepatized; both lungs were filled with crude tubercle. The pericardium was distended with effusion; the heart, large and flabby, was filled with fibrinous clots. The liver and spleen were natural: the kidneys large and congested. The intestines generally were inflamed and the ileum ulcerated; the mesenteric glands tuberculous.

Case 55.—Private Samuel Robbins, Co. G, 16th Me.; age 22; was admitted from Richmond, Va., April 18, 1864, with chronic diarrhœa, and died April 27. *Post-mortem* examination: Both lungs were filled with miliary tubercle;

the right lung contained a vomica and the pleura of that side was filled with serum; the pericardium also contained serum. The spleen was large and tuberculous; the kidneys natural.

CASE 56.—Private Eli Brown, Co. G, 2d East Tenn.; age 23; was admitted from Richmond, Va., April 18, 1864, with phthisis, and died May 17. *Post-mortem* examination: Both lungs were tuberculous and hepatized; the left pleural cavity contained a gallon of effusion. The pericardium was distended with turbid serum and the aortic valves thickened with ossific deposits. The spleen was soft and friable; the stomach, intestines and kidneys healthy.

CASE 57.—Private John G. Aldridge, Co. H, 5th Ind. Cav.; age 27; was admitted from Richmond, Va., April 18, 1864, and died June 1. *Post-mortem* examination: The pleural cavities contained effusion and the lungs were tuberculous, excavated and infiltrated with pus. The heart was flabby and filled with fibrinous clots. The liver and kidneys were natural, the spleen soft, the intestines congested and the mesenteric glands tuberculous.

CASE 58.—Private John James, Co. G, 45th Ohio; age 25; was admitted from Richmond, Va., April 18, 1864, with chronic bronchitis, and died April 28. *Post-mortem* examination: The lungs were extensively congested; the heart hypertrophied and soft. The liver was enlarged and congested; the gall-bladder distended; the spleen enlarged and softened; the kidneys normal. The mucous coat of the stomach and intestines was thickened and softened; the colon small and much thickened.

Ass't Surgeon IRA PERRY, 9th Colored Troops, filed a series of 41 *post-mortem* observations in cases of scurvy in the 25th Army Corps at Brownsville, Texas.* A careful examination of these records warrants the following statements:

The condition of the brain is recorded in two cases only. In both it was soft; in one there were two ounces of serum in the membranes, in the other the ventricles were filled with a dingy liquid, a small quantity of which also covered the surface of the hemispheres.

The lungs were mentioned as normal in 5 and altered in 28 of the 41 cases. In 16 of the 28 both lungs were affected, while in 8 the right and in 4 the left lung was the seat of the morbid changes. Of the 16 cases the lungs were pale in 6, atrophied in 2, congested in 2 and tuberculous in 6, one of which presented hepatization and another gangrene. Of the 8 cases the lung was congested in 1, hepatized in 1, carnified in 3, tuberculous in 2 and in 1 so disorganized that only about two ounces of its tissue remained. Of the 4 cases the lung was tuberculous in 3 and atrophied to two ounces in 1.

The pleural cavities were noted as abnormal in 14. One-half of these were characterized by adhesions and exudations of coagulable layers, the other by effusions of more or less turbid liquid, amounting in one instance on the right side to six pints. In one case there was an empyema of the right side.

The condition of the pericardium was noted in 20 cases. In one there was adhesion, in the others effusion, which, in one case, was associated with exuded lymph and in three with tubercle. With the exception of six pints in one instance, the largest quantity of effusion was eight ounces, present in three cases.

The condition of the heart was reported in 19 cases, in 3 of which it was normal. It was small, pale, soft or flaccid in one-half of the remaining 16; large in 2, dilated in all its cavities in 3 and in its right auricle in 1; covered with a red fibrinous coating in 1 and displaced to the right by a pleuritic effusion in 1. The valves of the heart were reported thin, deficient or cribriform in 19 of the cases. Fibrinous clots were noted in 8 cases, and in 11 it is stated that there were no clots.

The liver was noted in 28 cases, in 3 of which it was normal. It was tuberculous in 4; small in 4, in one of which it was yellow; large in 11, in two of which it was pale and yellow, in four purple or dark, in two mottled and in one congested and friable. Of the remaining 6 cases it was tough in 1, nutmeg-colored in 1, mottled in 1, brown and hard in 1, dark, with tar-like bile in the gall-bladder in 1 and coated with a layer of lymph in 1.

The spleen was noted in 35 cases, in 14 of which it was normal. It was tuberculous in 10, one of which was carnified and three enlarged; it was large in 5 cases, in two to three times the healthy size; it was small, pale and wrinkled in 4 cases; of the remaining 2 cases the weight, two ounces, only is given.

The pancreas was mentioned 11 times: 8 times as normal, once as large, once as small and once as tuberculous.

The condition of the kidneys was noted in 26 instances, in 5 of which they appeared normal. They were large in 7, one of which was pale, two flaccid and one friable; pale in 3; congested in 4; fatty in 2; flaccid in 3, in two of which they were also tough; in 1 they were small, weighing only two and a half ounces each, and in another they are said to have exhibited a change of structure and color.

The suprarenal capsules were large in 5 cases, attaining in one instance to three times the natural size; in 1 they were large and tuberculous and in 1 small.

The condition of the urinary bladder was noted in only 3 cases. In one case it was full; in a second it contained four ounces of urine and its thickened coats were so bound by adhesions as to be incapable of further expansion; in the third it was contracted into a small hard mass.

The stomach was noted 16 times: 7 times as normal, 4 times as distended with flatus or liquid and once as the subject of hour-glass contracture by a band of peritoneum. Of the remaining 4 the mucous membrane was pale and softened in two and red and congested in two.

The intestines were mentioned in whole or in part in 30 cases, in 5 of which they were normal or merely distended with air. They were recorded as pale in 4, in one of which the colon was congested; soft and thickened in

* Dr. PERRY published one of these cases, by way of illustrating the character of the whole number, in the *Boston Medical and Surgical Journal*, Vol. LXXIV, 1866, p. 155.

2; bluish or dark-colored in 2; ecchymosed in 1 and congested in 10, in four of which the colon was ulcerated. Of the 6 remaining cases the colon alone was reported as affected, in five with mild congestion and in one with ulceration.

The peritoneum was noted in 25 cases. It was tuberculous in 5, in four of which there was adhesion and in one effusion; congested in 2 and adherent in 3, in one of which there was a small quantity of reddish serum. There was effusion in 6, in four of which there was also exudation, and there was exudation in 7 cases associated with more or less of congestion. Lastly, in 1 there was thickening and in 1 a dark-slate color of the membrane.

The condition of the mesenteric glands was noted in 27 cases, in all of which there was more or less enlargement and in many softening; in 2 the glands were of a dark color and in 7 tuberculous. The cervical and bronchial glands were frequently associated in the morbid conditions of enlargement, softening, darkening or tubercular degeneration. In one case there was suppuration of the cervical, axillary and mammary glands.

In one of the 41 cases no section was made; the *post-mortem* record noted only the condition of the lymphatics and a perforate empyematous thorax.

On reviewing the history of scurvy in our armies it is seen that, excluding a few local outbreaks, the troops were kept free from active manifestations of the cachexia. In fact it may be said that as a whole the United States Army was as free from the scorbutic taint as were the British troops in the Crimea during the year ending June 30, 1856, when, although a small number of admissions were noted, they were not recorded on the table of sick-rates, as they constituted only a fraction of a monthly rate of one case per thousand of strength. Nevertheless scurvy, in the general opinion of the profession, occupied a prominent place among army diseases. This must be attributed to the frequency of cases among the rebel prisoners at Northern depots and the generally scorbutic condition of our own paroled or exchanged men rather than to the actual presence of the disease among our troops in the field and garrison.

A few reports on file indicate that although cases of developed scurvy were rare the scorbutic taint complicated other diseases, rendering them intractable and correspondingly dangerous. Besides references to such complications in reports already submitted, as in those of BILLINGS and RAWSON, the following have been discovered:*

Surgeon H. P. STRONG, 11*th Wis., Des Arcs, Arkansas, June* 30, 1862.—Our army, composed mostly of raw recruits from rural districts, subjected to the fatigues of long marches, unused to the bivouac or the exposures of a camp and southern climate, and suffering more or less from want of proper food supplies, has not been exempt from the diseases incident to the service; yet I was a little surprised during the latter part of May to notice scorbutic symptoms in several cases of dysentery and remittent fever. I had been of the opinion that fresh meat and dried vegetables are good preventives of scurvy. We have had a fair proportion of these issued, but the men are scorbutic. There has been no case of scurvy proper; but many cases of dysentery and remittent fever have been complicated with hemorrhage from the mucous membranes, in a few cases to an alarming extent. Sometimes the bleeding appeared to come from the entire length of the alimentary canal, while frequently it was only observed from the nose, mouth and fauces. In one case of continued fever epistaxis was so persistent that plugging was resorted to with the effect of arresting it there, while it started afresh from the mouth and fauces. When last seen this young man was recovering under the use of large doses of muriated tincture of iron. In a few cases I have observed slight purpuric spots on the legs and chest. I have not noticed sponginess of the gums except in a few persons that had been taking mercury nearly to ptyalism. A mess which has been kept well supplied with vinegar has not furnished me a scorbutic patient. It has been impossible to provide the command with vinegar. Fresh vegetables cannot be obtained in any quantity; the enemy destroys them rather than permit them to fall into our possession. In our circumstances I believe vinegar to rank among the best antiscorbutic remedies. The only medication of any advantage is the liberal use of mineral acids. Muriated tincture and proto-sulphate of iron are particularly applicable; they seem to arrest hemorrhage and impart tone and vitality to the capillary vessels, or, as the case may be, reinvigorate their nervous distribution. Nitro-muriatic acid seems appropriate when there is much hepatic derangement. The scorbutic diathesis would hardly be worth mentioning in this connection were in not that it complicates diseases of a character grave enough, in camp life and at this season of the year, when uncomplicated. A tendency to congestion is characteristic of all our diseases.

* The *Chicago Medical Examiner*, Vol. III, 1862, p. 531 *et seq.*, in what purports to be remarks accompanying the monthly report of Surgeon H. C. FOOTE, 22d Ohio, for August of that year, has the following: "There have been no cases of scurvy, pure and simple, during this month, and scarce any since the regiment has been in service, but very many of the patients have suffered in a way that could not be accounted for except on the supposition of some scorbutic taint. In various instances, but generally in cases of diarrhœa and dysentery, there was marked œdema of the lower extremities and sometimes of the face also. Partial paralysis of one or more limbs has not been uncommon, and in one or two cases, which proved fatal, there were ecchymoses, in one case quite extensive. The treatment most successful with these cases, after subduing the active disease, was the administration of iron, acids and nourishing diet." G. P. HACHENBERGER, Ass't Surgeon, 28th Ohio, in a correspondence published in the *Ohio Medical and Surgical Journal*, Vol. XIV, 1862, p. 388, dated Cox's Division, West Virginia, Aug. 1, 1862, mentions some of the evils unfavorably affecting the health of the division, and among them the appearance of a scorbutic taint on account of a deficient supply of vegetables. He considers that the existence of this condition added greatly to the difficulties of treating some complaints, particularly dysentery, ulcerations and cutaneous diseases.

Surgeon HENRY CAPEHART, *1st Va. Cav., Valley of Virginia, June* 30, 1862.—The most prominent symptoms of disease among the men of my regiment consist of general debility and an evident tendency to scorbutus. If these are neglected they soon develop into jaundice, typhoid fever or pneumonia. But by the free and timely use of acids, quinine and alcoholic stimulants this condition is removed and the patient restored to duty in from two to four days. I cannot too strongly recommend the use of tonics and stimulants in the treatment of the diseases incident to camp life. My success has been so uniform in the treatment of acute pneumonia by this plan that I have been forced to entertain serious doubts as to its inflammatory character.

Although such a complication no doubt existed in many local instances where a true scorbutic taint had been developed, the statistics of the war do not permit the supposition that this was at any time a general condition. Certainly the hard work, loss of sleep, exposures in all kinds of weather, and the imperfect dietary so often associated with active field service, resulted in many instances in a debilitated condition of the system which rendered the soldier peculiarly prone to succumb under attacks of acute disease; but it is doubtful if in all such cases the term scorbutic could with propriety be applied to the cachexia developed. Even the improved condition which frequently attended the free issue of vegetable food does not establish the scorbutic nature of the deterioration; for such issues were usually associated with a temporary cessation of active field work, during which many harmful conditions were replaced by those which were salutary. The constitutional state resulting from the deteriorating influences of the war was of a typhous or adynamic nature rather than simply scorbutic.

SYMPTOMS.—The first manifestations of the scorbutic condition were usually languor, lassitude, fatigue on the slightest exertion and dull aching pains in the legs and feet; but otherwise at this time the patient was in his usual condition, his appetite good and bowels regular or perhaps inclined to be torpid. In a short time the pains increased in severity, affecting chiefly the muscles of the legs and in some cases those of the back and superior extremities. The pain was often referred to the bones and in many cases to the larger joints. Soldiers reporting at sick-call with these symptoms were at first regarded as affected with rheumatism. The insidious character of the disease favored its unnoted invasion. No doubt in many instances its pains have been regarded as rheumatic, its debility as resulting from malaria, and even its manifestations on the gums as a local affection induced by irritating chewing-tobacco, accumulations of tartar, carious stumps and other unhealthy conditions; but in general our medical officers appear to have been from the first, and particularly after the alarm of scurvy in the Army of the Potomac, on the alert for the appearance of the disease, and to have formally announced its presence if, in a case of debility with muscular pains, the gingival margins were found slightly tumid or to bleed easily when the thumb-nail of the examiner was rasped along them, although the calves of the legs might not present any petechial discolorations. The want of correspondence, to be noted hereafter,* between the prevalence of scurvy and of the rheumatic affections shows very definitely that pains in the muscles, bones or joints, due to the scorbutic cachexia, were not erroneously reported as rheumatism, but met with proper recognition and treatment in the practice of our medical officers. Sometimes debility and wandering pains formed the only grounds for a diagnosis.† As WOODHULL has expressed it, the disease veiled itself under the guise of chronic rheumatism. This view, generally accepted by our medical officers, was in one instance officially promulgated:

GEORGE SUCKLEY, *Surgeon, U. S. Vols., Medical Director, Eleventh Army Corps, to Surgeon* GUNKLE, *in charge of the Field Hospital of the Corps, dated June* 9, 1863.—I notice that there have been many cases in hospital of soldiers

* See *infra*, page 833.

† See remarks of Dr. FRANCIS R. LYMAN, page 687, *supra*.

complaining of painful and "weak" backs, with painful sensations in the hips, thighs, etc. Some of these simulate renal affections, while others are looked upon as rheumatism, neuralgia and even acute or chronic spinal meningitis, and treated accordingly. I wish to draw the attention of your medical officers to the fact that the data in the Surgeon General's office have pretty clearly established that many of these cases are purely *scorbutic* and should be treated accordingly. Please impress also upon the minds of your officers that most of our army cases of chronic rheumatism and chronic diarrhœa are attributable to the same cause. You are respectfully requested to furnish your medical officers with a copy of this letter.

As indicated in this communication, diarrhœa also was considered a prominent symptom of incipient scurvy. Its subsidence when the scorbutic taint was effaced by an appropriate diet established in the minds of many its symptomatic character. By some the intestinal affection was regarded as an accidental association, for where diarrhœa was so prevalent as to occasion 711.46 cases annually in every thousand present, the chances of its occurring in a scorbutic individual were very great. But since, as already mentioned, the vegetable diet, which cured both the scurvy and the diarrhœa, was usually associated with the removal of many conditions known to occasion and aggravate the latter affection, it seems probable that the diarrhœa was neither a symptom nor a purely accidental complication of the scorbutic taint, but that its causes were intimately connected with the military conditions which gave origin to the cachexia by preventing the issue of fresh vegetables.

When more fully developed, however, the scorbutic disease was so invariably accompanied by diarrhœa that the constitutional state must be conceived as having predisposed to the local affection. According to Act. Ass't Surgeon FEE of the Annapolis hospital, it was a noticeable fact that all our returned prisoners who were scorbutic suffered from diarrhœa, and that the grave condition of the bowels was indicated by the color and odor of the stools and their admixture with blood and mucus.* Indeed, in a majority of the fatal cases an exhausting diarrhœa or dysentery, sometimes of twenty to thirty stools daily, precipitated the issue; and in cases of recovery the intestinal disease was seldom controlled until an improvement was manifested in the general health.

Subsequent to the rheumatic or diarrhœal stage of incipiency the gums became tumid, red, spongy and disposed to bleed, the teeth loose in their sockets and the breath exceedingly offensive. The swollen gums assumed a darker color, rising to the level of the dental crowns and obscuring the lateral view of the molars, bicuspids and canines. After this their tissue broke down or sloughed away, leaving the necks of the teeth bare and frequently carious: mastication became difficult or impossible and sometimes the teeth dropped out,—in case 16, treated at the Satterlee hospital, seventeen teeth are said to have been lost. At the same time the appearance of the patient became changed from the healthy condition. His skin was dry and rough; his slow movements and mental despondency proclaimed his debility, and his pale, waxy, puffy, anæmic aspect indicated the grave deterioration that had taken place in the blood. This was further manifested by the indisposition of wounds to heal, slight scratches becoming converted into indolent ulcers or affected with erysipelatous or gangrenous inflammation. Individual instances of this kind were observed by medical officers in the field during the local outbreaks already mentioned: but, as a general dyscrasia affecting wounds, it has been noticed only by Southern writers. Dr. JONES refers to the ulcerations induced among the prisoners at Andersonville by slight injuries, as the

* See case 44, page 700. In an article by W. R. CORNISH, Statistical Officer, Madras Medical Department, in the *Madras Monthly Jour. Med. Sci.*, Vol. I, 1870, p. 177,—*On Scorbutic Maladies as exemplified in the Medical History of the Royals in India sixty years ago*,—in which the author attributes the excessive mortality which formerly attended the arrival of British regiments in India less to climatic conditions than to scurvy developed by the confinement and imperfect dietary of the long voyage, it is stated that—"In India, according to my own observation, the stress of the scorbutic disease generally falls on the large intestine. In cold countries the spongy gums, œdema of the limbs and extravasation of blood beneath the skin are the more common symptoms; but here, often the first manifestation of the disease is a disordered condition of the bowels, depending on destructive ulceration of the mucous surface of the large intestine."

prick of a splinter or the scratching of a mosquito bite,* and Dr. PAUL F. EVE, speaking of scurvy in the Confederate Army, says:†

It certainly did complicate wounds and seriously interfered with surgical operations, and was itself aggravated by erysipelas, syphilis, spurious vaccination. Secondary hemorrhage became much more frequent from wounds and operations after the battle of Chickamauga and Missionary Ridge, September and December, 1863, attributable justly to the increased scorbutic tendency in the soldier as the war progressed. In proof of this assertion the official report of *nineteen* cases of secondary hemorrhage occurring in the Gate City hospital after the battle of Chickamauga might be presented.

Coincident with the tumefaction of the gums petechial spots appeared on the lower extremities, generally at first on the calves of the legs. These were followed by larger hemorrhagic discolorations, varying in hue from a dusky-yellow to a dark-purple. The inner aspect of the thighs was also frequently affected; but all parts of the superficial tissues were liable to the extravasation. The spots varied in size and shape; in some instances a continuous discoloration extended along the trunk, thigh and leg. Meanwhile the affected limbs became œdematous, pitting on pressure, and afterwards more resistant, as if some degree of coagulation had taken place in the liquid transuded into the intercellular spaces. Local congestions determined the formation of tumors, which subsequently became ulcers, presenting swollen margins and dark-colored, fungoid and fetid granulations. The knee and ankle joints in some instances became painful, stiff and contracted. Debility increased, the pulse became slow and feeble or, in the presence of the diarrhœal affection, rapid and weak; occasionally the patient suffered from exhausting night-sweats. Effusions into the peritoneum, pleura or pericardium caused oppression of the breathing and interference with the circulation. Death occurred from the intestinal affection, from pulmonary œdema or other effusions causing cardiac oppression or coma, or suddenly after muscular exertion

In the majority of cases presented during the war improvement was rapid under appropriate diet and medication. In some, however, the gums remained spongy and tender long after the other symptoms had disappeared. Not unfrequently, also, in cases of slow improvement, the patient continued weak and suffered from palpitation on exertion; in other cases, notwithstanding the removal of the characteristic scorbutic symptoms, a rheumatic condition persisted, necessitating the discharge of the soldier,—in one of the cases submitted above the patient, after five months of treatment, was discharged from service as being unable to walk without crutches.

Nyctalopia as a symptom of scurvy does not appear to have been observed in the Union armies. Sporadic cases occurred, but no general tendency to night-blindness has been recorded as connected with the scorbutic taint. According to Surgeon J. C. NORTON, U. S. Vols., who reported its extensive prevalence during the summer of 1864 in the 3d Division, 4th Army Corps, the robust and plethoric were affected rather than the debilitated:

As far as my personal observation extends the disease occurs more frequently in robust, plethoric persons than in those of lax and feeble habit. The first case I saw occurred in the 19th U. S. Inf., May 8, 1864, after a hard day's march from Ringgold to Buzzard's Roost, Ga., in the hot sun. It came on suddenly. After this several other cases occurred, and as the campaign advanced the disease appeared to rage as an epidemic. Some regiments had to lead thirty or forty blind men every night. Surgeons did not understand the disease and were unable to treat it successfully. It is very common for medical officers, when they do not understand the disease, to accuse the soldier of *malingering;* so, in regard to night-blindness, many considered all cases feigned. I am aware that when a disease becomes popular there are many soldiers who will take advantage of it and feign the symptoms to avoid duty. At the same time my observation has taught me that there is not one-half as much malingering in the army as is generally supposed. That mental influences have much to do with the production of disease there can be no doubt, as chorea has often been caused by witnessing the convulsive movements of a patient, and it is likely that the expectation of and attention to any disease act as predisposing causes of the disease itself. Nostalgia manifests itself in a

* See *supra*, page 37.

† *Nashville Medical Journal*, Vol. I, N. S., 1866, p. 16.

variety of ways; but there is no doubt that the nervous system is primarily affected, and it is not unreasonable to suppose that the irritability of the nervous centres which characterizes nostalgia is in some instances a predisposing cause of nyctalopia. There is no doubt in my mind that the exciting cause of night-blindness is excessive use of the eyes and exposure to bright light and oppressive heat, causing local congestion first of the ciliary vessels supplying the iris and then of the vessels of the retina. The pupil is sometimes found contracted and sometimes dilated, and I have seen several instances in which there was unequal dilatation, one pupil being contracted, the other dilated. In general the only reason why the patient cannot see at night is because the pupil does not dilate sufficiently to take in the requisite number of rays to make vision distinct. The excitability of the iris is exhausted by continual irritation, so that it fails to respond to any but the strongest excitant. I do not believe that the disease is a form of amaurosis, as is taught by authors generally, but it may be combined with that disease. The distinctive character of nyctalopia, however, is congestion and partial paralysis of the muscular tissue of the iris. It should be remembered that the connection of this muscle with the optic nerve or the retina is very distant, the iris being supplied by the ciliary branches of the ophthalmic artery and the motor oculi nerve, while the retina is supplied by the arteria centralis retinæ and the optic nerve. A rational treatment consists in the removal of the exciting cause, giving nature a chance to restore the proper equilibrium of the circulation and nervous functions.

Dr. Robert J. Hicks of Williamsburg, N. C., affirms the prevalence of night-blindness in the Confederate Army of Northern Virginia, particularly at the period of the occupation of Fredericksburg.* The soldier who had been marching all day complained at nightfall that he could not see, and, like a blind man, walked, holding the arm of a comrade. No constitutional symptoms were manifested and the eyes appeared perfectly natural. Frequently only one eye was affected. At first the complaint was looked upon as a trick of the malingerer; but the continued dilatation of the pupil, when exposed to the light of a candle, demonstrated the morbid condition. It was considered to be a local innervation due to meagre diet, the want of vegetables and vegetable acids and the various depressing influences that then affected the soldier's health. Medication was of little avail. Cases frequently recovered spontaneously after treatment had been discontinued. According to Dr. Wm. Hays of Covington, Ky.,† at one time a prisoner of war at Point Lookout, Md., the disease was of frequent occurrence at that depot. His account does not differ from that of Dr. Hicks. In some cases the conjunctiva was injected and sometimes the lids were granular and the cornea ulcerated. Innervation from exposure to powerful sunlight is mentioned as the exciting cause. Scurvy was a frequent complication. When the general health was improved the sight became restored.

Perhaps the first mention of night-blindness in American medical literature, as a symptom of the scorbutic dyscrasia, was made by Dr. Edward Coale, U. S. Navy, in his account of the epidemic of scurvy which affected the crew of the frigate Columbia in her cruise around the world, 1838–40.‡ The vessel carried 450 men, but so many became affected with inability to see after sundown that the deck-work could not be carried on without their assistance. During the increase of these cases scorbutic disease became distinctly manifested. English observers, however, connected nyctalopia with scurvy at an earlier date,§ and recent papers appear to confirm the connection.‖

Notwithstanding the intimate association with scurvy demonstrated by the history of night-blindness, it is questionable if this constitutional state is other than one of many causes of a debilitating character that predispose to the local affection. Night-blindness may occur

* See *Richmond Medical Journal*, Vol. III, 1867, page 35. † *Cincinnati Journal of Medicine*, Vol. I, 1866, page 315.

‡ *American Journal of the Medical Sciences*, Vol. III, N. S., 1842, page 68 *et seq.*

§ Thus Gilbert Blane, in his *Observations on the Diseases of Seamen*, London, 1799, p. 485, has the following paragraph: There is a remarkable symptom sometimes attendant on this disease, which has escaped the notice of authors. This is the *nyctalopia*, mentioned in Mr. Telford's report. It was also common in the garrison of Gibraltar, among those affected with scurvy during the siege, as I was informed by Mr. Cairncross, surgeon to one of the battalions. It sometimes takes place in that incipient state of the disease which does not show itself by any visible symptom, but betrays itself, as mentioned above, by *ecchymosis* in case of bruises or by scorbutic ulcers.

‖ Thus of fifty prison cases treated by A. Porter, M. D., Civil Surgeon, Akola, India, and reported in the *Madras Monthly Journal of Medical Science*, Vol. V, 1872, p. 253, nyctalopia was present in thirty-seven cases or 74 per cent., and was the earliest symptom in thirty cases or 60 per cent.

in the absence of scurvy,* but doubtfully in the absence of all debilitating causes. Generally, also, there is a notable exposure to direct or reflected sunlight. The following extracts illustrate this:

Surgeon J. F. HAMMOND, *U. S. A., Fort Jefferson, Fla., Jan.* 1, 1862.—Nyctalopia occurred in a volunteer and was occasioned by the glare of light reflected from the water or from the white sand. It was treated by an emetic, calomel, salts, cups, blisters, bandages to the eyes excluding the light, rest and low diet. He was perfectly restored in a few days. After the lapse of a month or two the disease recurred, caused by the reflection of light from the water. He has undergone the same treatment and has now recovered.

Act. Ass't Surgeon W. R. SMITH, *Sioux City, Iowa, March* 31, 1862.—The snow, high winds and occasionally the reflection of a bright sun explain the cases of nyctalopia which appear in my quarterly report. Exclusion of strong light, rest and a collyrium composed of sulphate of zinc and morphia constituted the means effective for the relief and ultimate cure of all the cases that occurred.

Dr. TRIPLER, in his article on scurvy, written before the war, says that nyctalopia was of frequent occurrence among our troops in the field, particularly in Southern climates, and numerous cases, totally independent of scurvy, were observed during the Florida war.† The views of Drs. HICKS and HAYS, referring the loss of sight to a local innervation in constitutions enfeebled by hardships and exposures, may, therefore, be accepted as correct.

The MORBID ANATOMY of scurvy is not clearly defined by the *post-mortem* notes that have been preserved. In one case only, 51, was the condition of the blood stated; but from the invariable presence of subcutaneous and intermuscular extravasations, noted clinically, or of sanguineous effusions into the lungs or serous cavities observed after death, the abnormal condition of the blood may be regarded as a constant lesion.‡ The brain was seldom examined or seldom presented any noteworthy changes. The lungs were usually congested and adherent, often tuberculous. The pleural and pericardial cavities frequently contained effused liquid. The heart was soft and flabby; fibrinous clots were sometimes found in its

* After the close of the war the writer accompanied four companies of the 14th U. S. Infantry on their march from the coast of California into the Territory of Arizona. Three men became night-blind in crossing the Carrizo Desert to Yuma, where the sun-glare on the sand was very trying. They were not scorbutics. They had been well fed on the short voyage to California by way of the Isthmus, and before beginning their march they remained two or three months at San Francisco, where they had an abundance of fresh vegetables and fruits.

† *Cincinnati Lancet and Observer*, Vol. I, 1858, page 132.

‡ The earlier *post-mortem* observations in cases of scurvy, as well as those made in recent years with the microscope and chemical processes as accessories, give prominence to the condition of the blood. During the second voyage of Cartier to Newfoundland, 1535, his crew of 110 men became severely affected. "This malady being unknown to us, the body of one of our men was opened to see if by any means possible the occasion of it might be discovered and the rest of us preserved. * * * The heart was found white and putrid; its cavities were quite full of corrupted blood. The lungs were blackish and putrid; more than a quart of reddish water was found in the thorax. The liver was pretty sound; but the spleen somewhat corrupted and rough, as if it had been rubbed against a stone."—HAKLIUT's *Collection of Voyages*, Vol. 3, p. 225, quoted by JAMES LIND in his *Treatise on the Scurvy*, London, 1757, p. 298. Lord Anson's surgeons, 1740-44, observed that when the malady was well advanced the blood ran thin and seemingly very black, "and after standing some time in the porringer turned thick, of a dark muddy color, the surface in many places of a greenish hue, without any regular separation of its parts. In the third degree of the disease it came out black as ink; and though kept stirring in the vessel many hours its fibrous parts had only the appearance of a quantity of wool or hair floating in a muddy substance. In dissected bodies the blood in the veins was so entirely broken that by cutting any considerable branch you might empty the part to which it belonged of its black and yellow liquor; and when found extravasated it was all of the same kind."—*Ibid*, p. 255. M. CHALVET examined blood taken in quantities of 25 to 30 grams from the small veins of the forearm in scorbutic cases and found it fluid, pale and watery. The clot which formed was extremely dense and small and the serum in unusual quantity. The fibrin of the clot was in excess of that found in normal blood; it contained 4.5 parts per thousand, but as the case progressed the quantity diminished. A slight increase of albumen was observed in the serum—72 parts per thousand as compared with 69 parts in normal blood. The globules were reduced to 63 parts per thousand as against 138 parts in normal blood used in a parallel experiment.—See *Gazette Hebdomadaire de Médecine et de Chirurgie*, 2e *série*, t. VIII, 1871, p. 219. These observations are essentially similar to those of BURK, quoted from the Sydenham Society's edition of *Simon's Chemistry*, by Surgeon TRIPLER in his article on scurvy. They were made in three scorbutic cases that occurred in the Dreadnaught Hospital ship and are as follows:

	Scorbutic.			Healthy Blood.
Water	849.9	835.9	846.2	788.8
Solid constituents	150.1	164.1	153.8	211.2
Fibrin	6.5	4.5	5.9	3.3
Albumen	84.0	76.6	74.2	67.2
Blood corpuscles	97.8	72.3	60.7	133.7
Salts	9.5	11.5	10.9	6.8

According to the *Lancet*, Lond., Vol. I, 1885, p. 1134, the blood of three cases of uncomplicated scurvy under the care of F. STAZEVICH, in the military hospital at Moscow, was dark and fluid, and showed irregular red corpuscles and more or less atrophied corpuscles cohering together. After recovering this irregularity disappeared. The pleura, heart and aortic valves were ecchymosed. The spleen was enlarged, light-colored and friable; the liver enlarged; the cortex of the kidneys thickened. The intestinal mucous membrane was soft, swollen and ecchymosed, the solitary glands enlarged in one case; the colon ulcerated in one case; the peritoneal glands enlarged in all. The brain was anæmic. The middle glutei muscles had extravasations between their fasciculi. The liver-cells were enlarged and cloudy, as were also those of the epithelium of the urinary passages. The alveoli of the mesenteric glands were enlarged and filled with round cells of the size of white corpuscles. The mucous lining of the small intestine was disorganized, the commencement of the lymphatics containing finely granular detritus and the vessels distended and surrounded by extravasations.

chambers. The alimentary canal from the stomach downward was more or less congested, occasionally ecchymosed; pseudo-membranous dysentery was a frequent complication. The mesenteric glands were generally affected, even in the absence of ulceration or much congestion of the intestine. The peritoneum contained effused liquid and the viscera were sometimes matted by adhesions. No constant hepatic or splenic lesion was observed. The kidneys were sometimes congested.

PATHOLOGY, CAUSATION AND TREATMENT.—These, in the case of scurvy, are so intimately connected that it is impossible to speak of one without at the same time discussing the others. When scurvy was first observed among the crews of the early ocean navigators the disease was regarded as a contagious malady. The same view was taken by many of our soldiers who saw it for the first time during their confinement at Andersonville, for JONES informs us that they sedulously guarded their wells and springs, fearing lest some one suffering with scurvy might use the water and thus poison them. Apparently the wonderful recoveries following the use of fresh provisions when a vessel reached port, or on the return of spring in the case of outbreaks on land, should have demonstrated that the disease was connected with the continuance of a salt-meat dietary or the absence of greens and fresh vegetables; but medical men continued to ascribe it to bad air, dampness, improper diet and mental despondency, while prescribing infusions and syrups of scurvy-grass, watercresses and other herbs or the juice of oranges and lemons as medicaments. At this time a depraved condition of the blood in scurvy was generally acknowledged, the causes assigned being the imperfect materials from which this important fluid was elaborated and the failure of the skin and kidneys to effect its purification. COCKBURN,* in 1696, referred the origin of the disease to salt provisions, and pointed out how speedy was recovery under the use of colewerts, carrots, cabbages and turnips. He insisted that if proper care was taken with their diet seamen would not be so liable to the disease. BACKSTROM,† in 1734, contended that the primary cause of the disease was an abstinence from fresh vegetable food and greens, and that although other secondary causes might concur, recent vegetables were an effectual preventive. KRAMER,‡ LIND‖ and BLANE§ insisted on the value of lime-juice as preservative against the disease. From the experiences on which these opinions were based the abnormal condition of the blood was of necessity referred to a lack of something contributed to the system by fresh vegetables and fruits; and as the acid quality of many of these was their most notable characteristic, the pathology of the disease was considered unveiled.

Not until 1848 was a further advance made in our knowledge of the causes and prevention of the scorbutic condition. Then ALFRED B. GARROD of the University College Hospital identified the particular element of the diet which appeared by its absence to occasion the disease.‖ He pointed out that although fruits containing organic acids are highly antiscorbutic the acids themselves are not so; that milk, on which the infant thrives during the first year of its existence, contains, when fresh, no organic acid, and that all the substances noted as antiscorbutic contained larger proportions of potash than the articles of a scorbutic diet. His conclusions, which were advanced rather as hypothetical than as proved by extended experiments, were very generally accepted by the profession.¶

* See LIND's excellent summary of the literature of this subject, page 381 of his *Treatise on the Scurvy*, London, 1757.

† *Ibid*, page 394. ‡ *Ibid*, page 412. ‖ *Ibid*, page 160 *et seq.*

§ BLANE regarded the introduction of lime-juice into the navy supplies as an era in naval history. It was first issued on his recommendation in 1793, but he ascribes the credit of having effected its acceptance to the earnest writing of LIND. The quantity given daily to each man was at first three-quarters of an ounce with two ounces of brown sugar.—*Observations on the Diseases of Seamen*, by GILBERT BLANE, London, 1799, p. 490.

‖ *Monthly Journal of Medical Science*, Vol. VIII, 1848, page 457.

¶ They were as follows: 1st. That in all scorbutic diets *potash* exists in much smaller quantities than in those which are capable of maintaining health. 2d. That all substances proved to act as antiscorbutics contain a large quantity of *potash*. 3d. That in scurvy the blood is deficient in *potash* and

Meanwhile, in this country, lime-juice as a substitute for, or representative of, a fresh vegetable diet became so intimately associated in the professional mind with the prevention and cure of scurvy that it seems as if the operation of predisposing agencies had become forgotten; for when Ass't Surgeon JOHNS reported some of these influences as having conduced to the production of scurvy at Fort Laramie, Wyoming Territory, in 1858, he was called upon by the Surgeon General's Office for further investigation and report.* His statement of the causes was formulated as follows:

I. That the *primary* cause of scurvy is the absence of material furnished to the blood by fresh vegetable matter.

II. That from the primary cause the disease is *developed* by—1. Depression from exposure to cold, particularly during guard duty at night and the long-continued cold of winter; 2. Depression from fatigue; 3. *Insufficient ventilation* and crowding of men in a restricted place, whether in company quarters or on shipboard; 4. Too great a preponderance of salted food.

This brief sketch of the history of our knowledge of scurvy brings us to the period of the war. The disease had been satisfactorily connected with a deficient dietary. Its prevalence among bodies of men whose only constant insanitary factor was the limitation of the

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the quantity of that substance thrown out by the kidneys less than that which occurs in health. 4th. That scorbutic patients will recover when *potash* is added to their food, the other constituents remaining as before, both in quantity and quality, and without the use of succulent vegetables or milk. 5th. That the theory which ascribes scurvy to a deficiency of *potash* in the food is also capable of rationally explaining many symptoms of that disease.

* The report of Ass't Surgeon JOHNS was regarded with interest as suggesting the production of scurvy at Laramie from local causes, some of which might be determined by further observation. It was held in the first place that the garrison at Fort Laramie was probably provided with a more liberal antiscorbutic diet than certain frontiersmen and quartermaster's employés in the neighborhood of the post, none of whom had suffered from scurvy. The immunity of the mountain men having been attributed by Dr. JOHNS to their living chiefly on fresh meat, Surgeon R. C. WOOD, on behalf of the Surgeon General's Office, inquired how it came that, as regards scurvy, the condition of these men could be considered better than that of the troops at a post where, as at Laramie at the time in question, the commissariat had on hand, besides 526 head of beef cattle, 7,138 rations of mixed desiccated vegetables, 8,706 rations of desiccated potatoes and large quantities of dried apples, pickles, sugar and molasses. It was further shown by a reference to the abstracts of issues of a former year that fresh meat was supplied to the quartermaster's men in much less proportion than to the troops, and that while the latter had what might be considered large quantities of desiccated potatoes and mixed vegetables the former had none; nevertheless the quartermaster's men had been but little affected by the scorbutic taint. Moreover, contrasting the condition, as regards scurvy, of the garrison of Laramie with that of the troops on active service in Utah, it was found that while 42 cases were reported from the former command, averaging 325 officers and men, during the five months, Nov. 1, 1857, to March 31, 1858, only 17 cases were reported from the latter, averaging 1,800 officers and men. During this period the troops in Utah were much exposed in tents, were without vegetables and did not have some of the component parts of the regular ration with which the commissariat at Laramie was fully supplied. Assuming the accuracy of these data, it was claimed that scurvy at Laramie must have been due less to a deficient vegetable supply than to certain other conditions which affected them to a greater extent than the other classes of men mentioned, as for instance: 1. A want of sufficient ventilation of the quarters allotted to the troops; 2. A want of due proportion of regular exercise in the open air; 3. An impropriety in the manner of cooking of the food. Ass't Surgeon JOHNS was, in this connection, requested to report on: 1st. The kind of buildings occupied by the troops at Laramie, their occupancy, ventilation, heating, etc.; 2d. The manner of cooking the food; 3d. The duties of the troops, and, 4th. Shelter, duties and habits as to clothing, exercise, food, etc., of the quartermaster's employés. In reply to this Dr. JOHNS dwelt strongly on the monotony of existence as a cause of the disease in the soldiers. Apparently the chief point of distinction between the duties performed by the quartermaster's men and the soldiers consisted of the guard duty required of the latter at night. The quartermaster's employés performed more labor than the soldier, but it was of a different character and exercised a different influence on the mental and physical condition of the men. A certain monotonous routine and confinement hedged the soldier on all sides. His guard, drill and police duties were unvarying, and so fatiguing on this very account that when left to himself at their conclusion he seemed to feel little inclination to do aught but vegetate in his bunk, with some occasional spasmodic effort at foot-ball. "In the topography of a sentinel's post the chief characteristic is the *bee-line*. This is the straight and narrow path,—from it there is turning neither to the right hand nor the left. Longitudinally 'thus far and no farther' is the fiat; and thus, for two mortal hours, or any given more or less mortal time, according to the exigencies of the service or thermometer, the military pendulum vibrates his monotonous existence until the twice blessed 'relief' releases him from the effort to keep his falx cerebri in and parallel to the same plane of direction as that of his post. Thus there is necessarily a monotony of mental action, depressing in its character, too, from this very monotony, affording no stimulus to resist the morbific effect of exposure. Of course I particularly refer to the garrison duty of a peace establishment, when there is little to put the soldier on the *qui vive* of mental and physical vivacity,—and in ten years I have never known a sentinel to have a good excuse even to cry 'fire.' Now, add to this hopeless mental monotony the effects of depressing cold, particularly at night, after a day of monotonous *pendulistic* fatigue, and it would seem that no better reagent could be desired for either producing diseases characterized by debility or for developing such a disease from a germ derived from other causes. * * * Drill is also another effort to keep the falx in the plane of certain directions and to produce pantographic results with bodies, limbs and muskets or other weapons. Police duty is a daily funeral procession around the garrison with twig-brushes instead of cypress boughs for the mourners." But the work of the employés of the Quartermaster's Department afforded healthy occupation for the mind as well as for the body. As carpenters, blacksmiths, etc., they preserved their individuality; even the teamsters, having the management of their animals and a wholesome variety in their work, were unaffected by the mental depression resulting from a monotonous existence. The mountain men of the country, being their own masters, were even in better circumstances in this respect. They hunted, fished and were idle at their pleasure. As to fresh meat and supplies of desiccated vegetables, Dr. JOHNS suggested that the quantities issued to the troops, not those on hand in the commissariat, must be used in the argument. Carefully stored in boxes and issued homœopathically, the vegetables had no effect in raising a command from a scorbutic condition. On the other hand, the higher pay of the quartermaster's men enabled them to purchase from the sutler a variety in their diet, including fresh canned fruits, oysters and other luxuries, which was beyond the reach of the soldiers; nevertheless scurvy did occasionally appear among them. The frontiersmen, as to diet, had facilities for procuring such antiscorbutics as could not be obtained by the soldiers. In place of the tough and stringy beef cattle of the post they had juicy venison from the hills. In place of the salt-junk of the soldier, which had transferred to the brine its phosphates, acids, kreatine, etc., necessary to the formation of blood, they used a dried meat which had lost none of its nutritive essentials in parting with its water. Referring to the freedom of the troops in Utah from scurvy, Dr. JOHNS considered it sufficiently explained by the mental influences. They went into winter quarters after a wholesome march across the plains, and they were in lively anticipation of something like active service to vary the monotony of the previous condition of peace. In concluding, he held to the proposition that scurvy results primarily from imperfect supply or ratio of supply of the three kinds of material for the body—azotized, non-azotized and earthy, the point of departure being the want of fresh vegetable matter.

food-supply to a certain issue sufficiently proved this point. Salt meat, as forming the staple of the scorbutic diet, had borne for a long time the opprobrium of its production; but this view was not entertained in our camps,—occasionally the continued use of the salted ration was mentioned among the causes of an outbreak, but from the context in most cases of this kind it is evident that the consequent deprivation of fresh food supplies was the expression intended. The theory entertained acknowledged certain of the constituents of fresh vegetables as essential to the perfect nutrition of the tissues and to the prevention of the scorbutic condition, many of the reports indicating the salts of potassa as the salutary principles.

But other so-called causes are frequently mentioned. These include every influence that tended to lower the vital powers of the soldier,—such as over-fatigue, loss of sleep, exposure to cold and wet, particularly at night, over-crowding in quarters and the diseases to which these influences predisposed. Evidently the belief was entertained that all conditions and circumstances causing waste of tissue required an increased ingestion of the special material supplied by the fresh vegetables as well as the albuminoids and carbohydrates that formed the bulk of the nutritive supply, and that the proportion of the former which would preserve the balance of health under certain conditions would incline to scurvy when these became more exhausting. Chief among the adynamic influences was depression of spirits from whatever cause,—in the individual from nostalgia and private or personal troubles and anxieties, and in the command from ennui, the endemic prevalence of disease or the gloom and despondency attending disaster to the flag,—among the prisoners of war this was no doubt a powerful predisposing agency.

Prior to the outbreak of the Rebellion the U. S. Army ration consisted of—

Three-fourths of a pound of pork or bacon or one and a fourth pounds of fresh or salt beef; eighteen ounces of bread or flour or twelve ounces of hard bread, or one and a fourth pounds corn-meal; and at the rate, to one hundred rations, of eight quarts of beans, or in lieu thereof, ten pounds of rice, or in lieu thereof, twice per week, one hundred and fifty ounces of desiccated potatoes and one hundred ounces of mixed vegetables; ten pounds of coffee, or in lieu thereof, one and a half pounds of tea; fifteen pounds of sugar; four quarts of vinegar; one pound of sperm candles or one and one-fourth pounds of adamantine candles or one and one-half pounds of tallow candles; four pounds of soap and two quarts of salt.

But the act of Congress, approved August 3, 1861, provided for an increase during the continuance of the war:

Section 13. *And be it further enacted*, That the army ration shall be increased as follows, viz: Twenty-two ounces of bread or flour, or one pound of hard bread, instead of the present issue; fresh beef shall be issued as often as the commanding officer of any detachment or regiment shall require it, when practicable, in place of salt meat; beans and rice or hominy shall be issued in the same ration in the proportion now provided in the regulation, and one pound of potatoes per man shall be issued at least three times a week, if practicable, and when these articles cannot be issued in these proportions, an equivalent in value shall be issued in some other proper food, and a ration of tea may be substituted for a ration of coffee upon the requisition of the proper officer: *Provided*, That after the present insurrection shall cease, the ration shall be as provided by law and regulations on the first day of July, eighteen hundred and sixty-one.

The *Revised Regulations for the Army* in force during the war formulated this increased ration as follows:—

A ration is the established daily allowance of food for one person. For the United States Army it is composed as follows: Twelve ounces of pork or bacon, or one pound and four ounces of salt or fresh beef; one pound and six ounces of soft bread or flour, or one pound of hard bread, or one pound and four ounces of corn-meal; and to every one hundred rations, fifteen pounds of beans or peas,* *and* ten pounds of rice or hominy; ten pounds of green coffee, or eight pounds of roasted (or roasted and ground) coffee, or one pound and eight ounces of tea; fifteen pounds of sugar; four quarts of vinegar; one pound and four ounces of adamantine or star candles; four pounds of soap; three

* Beans, peas, salt and potatoes, fresh, shall be purchased and issued and sold by weight, and the *issue* of each shall be estimated at sixty pounds. Thus 100 rations of beans or peas will be fifteen pounds, the equivalent of eight quarts; 100 rations of salt will be three pounds and twelve ounces, the equivalent of two quarts; and 100 rations of potatoes (fresh) will be thirty pounds, the equivalent of half a bushel.

pounds and twelve ounces of salt; four ounces of pepper; thirty pounds of potatoes, when practicable, and one quart of molasses. The Subsistence Department, as may be most convenient or least expensive to it, and according to the condition and amount of its supplies, shall determine whether soft bread or flour, and what other component part of the ration, as equivalents, shall be issued. Desiccated compressed potatoes, or desiccated compressed mixed vegetables, at the rate of one ounce and a half of the former and one ounce of the latter, to the ration, may be *substituted* for beans, peas, rice, hominy or fresh potatoes.

The desiccated potatoes and mixed vegetables of the ration before the war were insufficient of themselves, in the quantities issued, to prevent the appearance of scurvy. It was supposed, however, that the other articles of the ration were in excess of the needs of the men, and provision was made for crediting each company with the money value of that portion which was not drawn from the commissariat for consumption. This credit constituted the basis of a company fund, which was disbursed by the captain for the benefit of the enlisted men of his company, pursuant to the resolves of a council consisting of all the company officers present. A company commander by exercising due supervision over the messing of his men was enabled to save money for the purchase of vegetables. Practically the company officers in council were authorized, if they found it for the benefit of their men, to let any part or the whole of the ration remain undrawn and purchase food supplies in open market with its money value. Generally, however, the troops were stationed where there were no supplies other than those retailed by the sutler at exorbitant prices. Hence the existence of scurvy during the winter and early spring months at posts unfavorably situated.

The considerable additions made to the ration at the beginning of the war would have enabled experienced company officers to have accumulated a large fund for use in varying the diet of the men and preventing the scorbutic taint; but volunteer officers were in general ignorant of their duties in relation to the domestic economy of military commands, and any excess of food that was not wasted by improvident cooking was thrown away. Subsistence officers also frequently discountenanced the attempt of company officers to improve the diet of their men by means of a company fund, as it complicated their accounts when sometimes all their energies were required to supply the ordinary issues. Of course there were many notable exceptions, especially in camps of some permanence, where, through the good management of the officers, company funds were accumulated and used to advantage; and as in these instances the company cooking was usually of a superior order and the men well cared for in other respects, these commands presented a marked contrast to those less efficiently officered.

But Congress made a liberal provision for the volunteer soldiers of the war. The issue of an abundance of the albuminoids, fats and starches was authorized; and to ward off the scorbutic taint, whether dependent on the continued use of salt provisions or on an abstinence from vegetables, the Subsistence Department was required, if practicable, to issue fresh meat on the order of a commanding officer of a military command and to furnish one pound of fresh potatoes three times a week to every man. Unfortunately, the clause *if practicable* defeated in a number of instances the intent of the legislators; and cases occurred, as reported by Medical Inspector HAMILTON, of regiments which for months at a time received not a single issue of fresh potatoes and were thus, but for somewhat better facilities for purchases, in no better condition as regards the prevention of scurvy than the soldiers that garrisoned Laramie and other Western posts before the war; but when these cases were brought to notice by the reports of the medical officer or medical inspector special efforts were made and the practicability of the distribution demonstrated.

In the treatment of the developed disease a fresh vegetable diet, fresh meat, acids, salts

of potash and tincture of iron were employed. From this the theories of causation adopted by our medical officers may be inferred. Fresh vegetables, meat and milk formed the staples of cure as well as of prevention. Among the vegetables used were potatoes, onions, fresh or pickled cabbage or sour-krout, lemons, oranges, limes, sweet potatoes, watermelons, green corn, etc. Corn-meal is highly lauded by one officer, and its use by Mexican troops is suggested as the cause of their freedom from scurvy; but the scorbutic condition of the Confederate armies on a corn-meal ration disproves his conclusions.*

The vegetable acids—acetic, citric and tartaric—were frequently employed, and, according to some, with advantage; but in these cases an improvement in the diet was always coincident. Others regarded these acids used alone as of no value. Vinegar, which has been a recognized antiscorbutic since the days of the early navigators, was highly valued and much used;† but there is no ground for assuming that a diluted acetic acid possesses any value. Vinegar, in addition to its volatile acid, contains solid matter of vegetable derivation. In exceptional cases the mineral acids—diluted nitric and sulphuric—were prescribed.

Of the potash salts the bicarbonate was preferred, given in conjunction with the vegetable acids; sometimes the bitartrate was used; occasionally the nitrate; but as fresh vegetables were invariably added to the diet it is impossible to determine the amount of benefit derived from the medication. The chlorate of potash was in general use as a local application to the gums; several officers testify to its value when used internally in doses of twenty to sixty grains daily. Weak solutions of nitrate of silver were also prescribed as topical applications.

Iron was supplied to the patient in the form of the tinctura ferri chloridi in doses of fifteen or twenty drops three times a day. Sometimes this acid tincture was used locally to promote a healthy action in the scorbutic sores.

Diarrhœa was treated by opiates and astringents, irrespective of the general antiscorbutic cause; but special medication was not employed on behalf of the pains unless they persisted after the scorbutic condition was apparently removed, when colchicum, guaiacum and iodide of potassium were tried.

Tonics, stimulants and change of air, occupation and mental impressions, the last often effected by a visit home on furlough and at other times by the opening of a campaign, were the means adopted to perfect the cure.

The danger of mercurializing the scorbutic patient was occasionally noted; but few instances have been placed on record.‡

It cannot be said that the history of scurvy in our armies has added much to our knowledge. It shows how readily the disease may be controlled by the adoption of appropriate measures; but this had already been repeatedly illustrated. It shows the powerfully predisposing influence of all the causes of adynamia; but this was also already well known. It shows that although the law may provide adequate means for the prevention of the disease, the desired and anticipated results may not always follow on account of difficulty in procuring or transporting the supplies needful for large bodies of men under the changeful conditions of active military service. Perhaps this is its most instructive lesson. From it

* Dr. Joseph Jones attributed the existence of scurvy at Andersonville to the effects of salt meat and an unvarying diet of corn-meal, with but few vegetables and imperfect supplies of vinegar and syrup; to these he added the influence of the foul animal emanations from the crowded and pestilential stockade.—Report No. 45, Fortieth Congress, 3d Session, Washington, 1869, p. 110.

† Surgeon McBride, 40th Ohio, called attention to the value of vinegar in an article in the *Cincinnati Lancet and Observer*, Vol. V, 1862, page 396.

‡ An instance of violent salivation resulting from the application of a small quantity of mercurial ointment, intended for the destruction of lice, is mentioned in the *Chicago Medical Journal*, Vol. XIX, 1862, p. 474.

may be foreseen the occasional appearance of the disease in time of war, unless the antiscorbutic principle be meanwhile obtained in a form in which its issue to the troops will be more frequently *practicable* than when associated with fresh beef on the hoof and potatoes in barrels.

Although GARROD's theory, indicating a deficiency of potash in the blood, has been before the profession for many years, accurate quantitative determinations of the salts of scorbutic blood have yet to be made. Shortly after this theory was suggested the nitrate of potash was shown to possess no antiscorbutic virtues.* It was also generally observed that although fresh beef and mutton contained, according to GARROD's own analyses, very notable quantities of potash, their antiscorbutic qualities were not proportionately manifested. Dr. BUZZARD† pointed this out, and suggested in explanation that the form in which the organic salts of potash exist in vegetable substances renders them more easily absorbed and decomposed by the digestive system than the potash salts of animal tissues. Somewhat later CHALVET‡ suggested that the chemical combination of the potash in fresh meat and dried leguminous vegetables prevents its assimilation by the human system. The phosphates of dried peas and beans, and the chlorides, phosphates and nitrates found in meat are too stable to be decomposed in the economy and are passed from the body for the most part unchanged: but the potash of fresh vegetables exists in the form of easily decomposed salts of the organic acids, as citrates, tartrates, malates, etc., which, when ingested, are transformed into carbonate,—and this salt, when in excess, gives an alkalinity to the urine and at all times presents the base to the tissues in an assimilable form; the acid being removed by the circulating current and the potash fixed in the tissues by the nutritive processes as phosphates, chlorides, etc. This explains the want of relation between the quantity of potash in certain articles of diet and their antiscorbutic value.

Much evidence might be adduced on behalf of the efficiency of fresh meat as an antiscorbutic.§ The preservation of hunters, trappers and mountain men from the disease has been frequently ascribed to their constant use of fresh meat or meat dried with all its salts intact. The Indians also have been frequently quoted in this connection.‖ But in all these instances the absolute exclusion of vegetable substances is not positively determined.¶ On

* It was tried by order of the Director General of the British Navy on scorbutic convicts *en route* to New Zealand. The nitrate at the end of two weeks was found to act so injuriously and to be taken with so much reluctance that its use on one vessel was abandoned. In another set of cases it caused irritability of the stomach and relaxation of the bowels to such a degree that it was necessary to combine opium with it. In a third set it seemed to impair the powers of digestion and assimilation and was therefore considered injurious. ALEXANDER BRYSON—who reported the results of these experiments—thought it would be worse than cruelty, under any circumstances, to persist in the exhibition of this salt either as a prophylactic or means of cure.—See *Medical Times*, Vol. XXI, London, 1850, p. 213.

† *Reynolds' System of Medicine*, Vol. I, London, 1866, page 749.

‡ *Gazette Hebdomadaire de Médecine et de Chirurgie*, 2e S., t. VIII (1871), page 219.

§ Thus, in the outbreak at Council Bluffs—see note, *supra*, page 683—the men detailed as hunters, who resided in the woods and subsisted on game, were in no instance unhealthy; and an outlying detachment, under the command of an officer who fed his men entirely upon fresh meat from the woods, experienced no sickness of any kind.—FORRY, in *American Journal of the Medical Sciences*, N. S., Vol. III, 1842, p. 80.

‖ Ass't Surgeon WASHINGTON MATTHEWS, U. S. A., in his *Ethnography and Philology of the Hidasta Indians*, Washington, D. C., 1877, p. 25, says: "Formerly they lived largely upon meat; when out on their hunts and war-paths they often lived exclusively on it. There were many nomadic tribes around them who seldom tasted vegetable matter, often living for seven or eight months in the year exclusively on meat and preserving perfect health. I have seen white men who had lived for years among the Indians, and during such residence for six months of every year lived on nothing but meat (and water of course), 'buffalo straight,' as they expressed it, and who, in the summers only, occasionally varied their diet with a mess of roots or berries,—not seeking such vegetable food with any particular longing or avidity. In various books of Western travel these statements are corroborated; yet there are modern physiologists who would try to persuade us that an animal diet is inadequate to the sustaining of human life in a healthy condition."

¶ Surgeon T. C. MADISON, U. S. A., already cited in note, *supra*, page 683, attributed the healthy condition of the Fur Company's men and the Indians not solely to the fresh game or dried buffalo meat on which they subsisted, but to this and the quantities of dried plums, buffalo and choke berries which they put up for winter use. And even Dr. MATTHEWS, in the paragraph succeeding that just quoted, has the following: "A portion of their corn they boil when nearly ripe; they then dry and shell it and lay it by for winter use; when boiled again it tastes like green corn. This is often boiled with dried beans to make a succotash. Their beans are not usually eaten until ripe. Squashes are cut in thin slices and dried; the dried squash is usually cooked by boiling. Sunflower seeds are dried, slightly scorched in pots or pans over the fire and then powdered. The meal is boiled or made into cakes with grease. The sunflower cakes are often taken on war-paths, and are said, when eaten even sparingly, to sustain the consumer against fatigue more than any other food. They gather all manner of dried roots and berries that are eaten by the nomadic tribes of the same region; but they do not consume them to the extent that the wilder tribes do."

the other hand, many instances might be cited from the literature of the subject where, in the presence of more powerful predisposing factors, fresh meat, in the absence of vegetables, has failed to protect from scurvy.* Such testimony indicates that although fresh meat possesses an antiscorbutic value which may be preservative under favorable conditions, its qualities in this respect are by no means equivalent to those manifested by a similar ingestion of potash salts as furnished by fresh vegetables.

By comparing the analysis of scorbutic and healthy urine, Dr. RALFE,† of the Seamen's hospital, Greenwich, England, has inferred that in the diseased condition there is a diminished alkalinity of the blood; and as the home-service diet of the British soldier, which includes potatoes and other vegetables, contains a much larger proportion of salts susceptible of conversion into alkaline carbonates, that the diminished alkalinity must be attributed mainly to the withdrawal of these readily decomposable salts from the diet. The potential alkalinity of the soldier's ration, which is regarded as a typical antiscorbutic diet, is equivalent to 10.3 grams of bicarbonate of potash, while that of the sailor is equal to only 5.9 grams. He points out that under no condition has the blood ever been observed to become acid, and that its normal degree of alkalescence cannot be reduced without causing disturbances of nutrition, citing in evidence the experiments of LEYDEN and MUNK and F. HOFFMANN, which show that attempts to reduce the alkalinity of the blood in animals terminate in death with changes in the blood and tissues identical with those found in the bodies of persons who have died of scurvy. It would seem, therefore, that the disease is due to a chemical alteration in the quality of the blood which interferes with the processes of nutrition.

But, whether scurvy is caused by a deficiency of potash in a readily assimilable form or by a change in the blood from a want of the alkaline salts that are best supplied by the vegetable kingdom, it is evident that soldiers in the field may easily extract materials from *the ashes of their camp-fires* to supplement a defective diet. It must be remembered, however, that the antiscorbutic virtues of the salts in question have not been satisfactorily demonstrated.

CHAP. IX.—ON DISEASES ATTRIBUTED TO NON-MIASMATIC EXPOSURES.

Apart from miasmatic influences the exposures incident to active service in our armies were credited with the development of acute diseases of the organs of respiration, tonsillitis, diphtheria, rheumatic affections, consumption, etc. The continuance of cold rainy weather during a campaign was productive of an access of such cases. The active occupations of the camp or march protected the men during the day from the injurious effects of the weather; but at night they were fully exposed to its influence, whether standing guard in camp or on picket, or endeavoring to gather warmth enough amid the all-pervading moisture to enable them to pass a few hours in sleep. Fresh levies were especially prone to suffer under such conditions. A tedious railway journey in bad weather, with a bivouac in the streets at its conclusion or temporary quarters in some unwarmed building, was often as disastrous to a

*FREDERICK IRVING DE LISLE, *Medical Times and Gazette*, Vol. II, London, 1877, p. 301, states that the disease appeared among the squatters in Queensland during the droughts of 1866 and 1868, when, during the dearth of vegetables, they lived upon lean mutton and baked flour; also, that during the war in New Zealand in 1869–70 a scorbutic taint was developed among the troops, whose rations consisted of lean mutton and biscuit. Many instances are cited by BUZZARD, in his article on *Scurvy* in *Reynolds' System of Medicine*, Vol. I, London, 1868, pp. 747 *et seq.*

†*Inquiry into the General Pathology of Scurvy*, by CHARLES HENRY RALFE, *Lancet*, London, 1877, Vol. I, p. 870 and Vol. II, p. 81.

new regiment, en route to the front, as some of its subsequent battles. Notable variations in temperature were injurious even when the degree was not absolutely low. The specific poison of measles rendered new troops particularly susceptible to catarrhal attacks from trifling exposures.

Cold and dampness manifested their combined effects even in winter quarters, when the men were supposed to have made themselves as comfortable as possible. Sometimes this was due to insufficient supplies of clothing and blankets. Frequently the camp soil was so retentive of moisture that no system of trenching sufficed to give the troops dry huts and protect their feet from the dampness and discomfort of the mud of their camp-ground. Catarrhs, sore throats and rheumatism were endemic in these undesirable locations.

The difficulty of heating the tent or hut was, at first, a cause of much sickness. Camp-stoves, furnished by the supply department or purchased by the men, were small and of thin metal. A few pieces of wood, which were consumed in as many minutes, rendered the air of the confined space oppressively hot, but if the tent had any ventilation the temperature fell immediately until again raised by fresh supplies of fuel. Hence, to avoid excessive over-heating and the labor of constant attention to the stove, an attempt was usually made to prevent the escape of the warm air from the tent. Every aperture by which the foul air of the interior might be replaced by cold streams from without was carefully chinked. But the endeavor to retain the foul air led to greater hygienic errors: It converted the hut into a cellar by excavation and the banking up of the excavated earth against the outer aspect of the walls. It led also to overcrowding for the sake of warmth, and to permit of the clubbing of blankets, overcoats, shelter-canvas, rubber blankets and other available bedding. From crowded holes of this kind typhoid pneumonias and diphtherias were reported instead of the catarrhs and quinsies of simple exposure to cold.

Medical officers condemned these attempts at comfort, and in subsequent winters a better style of log and canvas hut was constructed by the troops. Men who knew nothing of this kind of work took hints in building from the backwoodsmen of Maine and Michigan. The new huts were trenched on the outside to secure dryness of site; they were floored with split logs and provided with a roomy fireplace. A more equable temperature was secured, especially at night; but ventilation was defective and the space overcrowded.

In the hastily-constructed pavilion barrack-rooms of permanent quarters the heating arrangements for winter occupation were generally insufficient. Men whose bunks were near the stove or fireplace were usually overheated, while those at a distance were exposed to cold from the pervious character of the walls. Unequable heating was associated with defective ventilation and overcrowding.

Although generally attributed to cold and dampness, bronchitic attacks are in some of the reports regarded as originating in the inhalation of dust and irritant sandy particles.

The following extracts are submitted:

Surgeon Isaac F. Galloupe, *17th Mass., New Berne, N. C., April* 1, 1862.—The only prevailing disease has been bronchitis, and the cause of its prevalence was long-continued exposure to moisture consequent upon leaky quarters and insufficient protection of the feet against wet.

Surgeon J. A. Wolf, *29th Pa., Frederick, Md., Dec.* 31, 1861.—Since our return to Camp Carmel the prevailing complaints have been mild catarrhal affections, yielding readily to ordinary expectorant mixtures and other mild remedies. This is rather remarkable, since many of the men had wet feet during almost the entire march.

Surgeon Jno. S. Jamison, *86th N. Y., Good Hope, Md., Dec.* 31, 1861.—The regiment has changed its location three times. These changes have happened in inclement weather, and before the tents of the men could be made comfortable at each new location many cases of catarrh were developed. Three cases of pneumonia have grown out of these cases of catarrh.

Surgeon J. M. BATES, *13th Me., Ship Island, Miss., April* 2, 1862.—My impression is that many lung diseases were induced by overheated and inadequately ventilated tents, and sudden exposure to cold on going out while in a state of perspiration with insufficient clothing.

Ass't Surgeon A. J. DICKERHOFF, *27th Ill., London, Tenn., Feb.* 28, 1865.—The regiment was on the move during the greater part of the month, generally in a rolling country in the region of the Holston and French Broad rivers, above Knoxville. The weather was changeable and at times very inclement, with cold rains and one snow-fall. The roads were muddy and as the shoes of many of the men were worn out their feet were generally wet; the clothing of many was inadequate and their shelter insufficient, but this latter was in part remedied by their energy and their experience as old soldiers. Some of the marches were difficult; some forced; some made by night. There was an unusual number of rheumatic cases, most of them, however, not requiring excuse from duty; many of these seemed to be the result of soreness or sprain from hard marching in addition to the rheumatic tendency. Cases of respiratory disease were not so numerous as might have been expected under the circumstances. The symptoms in the more serious cases were active but not severe. Treatment was at first moderately antiphlogistic, including the use of quinine if, as was usual, malarial symptoms were also present; afterwards diaphoretics and expectorants were used. I infer that for the prevention of this class of diseases troops in field service should not be too warmly or closely housed, as catarrhal attacks depend more on sudden or marked changes in temperature than on its degree or continuance. The troops should be adequately clothed, including good shoes and socks, blankets, overcoats for inclement weather, sudden changes and night duty, and rubber blankets against rain and for shelter by day and night.

Surgeon LOUIS WATSON, *16th Ill., Post Surgeon, St. Joseph, Mo., Dec.* 31, 1861.—Much of the bronchitis and pneumonia which has prevailed may be attributed to the discomfort which the men have experienced in going to sleep in heated quarters without suitable covering to guard against the low temperature occurring after the extinguishment of their fires.

Surgeon JOSEPH P. COLGAN, *59th N. Y., Fort Good Hope, D. C., Jan.* 9, 1862.—The weather for the season of the year has been favorable; yet the temperature has been variable and the transitions quick. This has produced perhaps more sickness from diseases of the respiratory system than a colder and less variable season might have caused. Catarrhal affections have prevailed to a considerable extent. Another cause of the prevalence of such complaints is to be found in the fact that the tents in which the men sleep are furnished with small sheet-iron stoves of poor quality, easily and quickly heated and as quickly cooled again. Unless these stoves are constantly supplied with fuel the temperature quickly falls to a low range, so that the men's quarters are all the time either too hot or too cold. Just before the break of day, when the mercury ordinarily falls many degrees lower than at any other hour, the men from fatigue being all asleep, the stoves go quickly out, and, as the top of the tent is open to the atmosphere, dew, frost, snow or rain, as the case may be, descends on the men, who appear at surgeon's call with complaints of pains, coughs, colds, fevers, etc.

Ass't Surgeon T. W. MCARTHUR, *39th Ohio, Palmyra, Mo., Dec.* 31, 1861.—During November there were several cases of diphtheria and pneumonia. The weather was cold, with snow, and in most of the tents some form of heating apparatus was constructed, usually furnaces. I doubt not these furnaces had much to do in producing disease. I may here mention an interesting incident: At midnight I was called to see a man who was said to be dying. On arriving at the tent I found two men in slight spasms while a third was wild with delirium. In the centre of the tent was an open vessel filled with coals. The canvas had been rendered almost impervious to air by a coating of snow on its surface. I lost no time in dragging the smothering men into the open air. They all recovered.

Surgeon E. P. MORONG, *2d Md., Dec.* 31, 1861.—The regiment is quartered in the common wedge or servants' tent. Eight of the companies were supplied with tents so worn by previous service as to be unfit for the protection of soldiers, especially at this season of the year. Straw has been supplied, but most of the men refuse to use it, believing it to be a fruitful source of vermin. The tents are all heated by small sheet-iron stoves or by trenches passing beneath the flooring, in one end of which a fire is built. An apartment so small is quickly overheated, and the sudden change of temperature to which the men are exposed in passing in and out of the tent is a constant source of catarrhal complaints. Moreover, as there is no means of ventilation except by leaving the flap open, which no soldier will do at this season, the atmosphere of the tent is constantly more or less vitiated. The men are generally clean and orderly in their habits. Their clothing is of poor material and they have been supplied with but one blanket each, many of which are made of two thin sheets of cotton and woolen material machine-stitched together.

Surgeon JNO. LETTERMAN, *U. S. A., Medical Director, Army of the Potomac, to the Adjutant General of that army, March* 9, 1863.—I have the honor to invite the attention of the Commanding General to a practice quite prevalent in this army, that of excavating the earth, building a hut over the hole and covering it over with brush and dirt or canvas. This system is exceedingly pernicious and must have a deleterious effect on the health of troops occupying these abominable habitations. They are hot-beds for low forms of fever, and when not productive of such diseases the health of the men is undermined, even if they are not compelled to report sick. I strongly recommend that all troops that are using such huts be directed at once to discontinue their use, and that they be removed to new ground and either build log huts above the ground or live in tents. I also recommend that in huts covered by canvas the covering be removed at least twice a week, if the weather will permit, and that the men throughout the army be compelled to hang their bedding in the open air every clear day. In huts not built over an excavation, but covered with brush and dirt or other materials which cannot be removed, such apertures as the Medical Director of the corps may deem necessary should be made to allow light and ventilation. I am convinced of the propriety of these suggestions as well from my own observations as from the information which I have derived from reports of inspections made by my orders within the past few weeks.

Attending Surgeon HENRY E. TURNER, *Fort Adams, Newport, R. I., April* 1, 1863.—A large proportion of the cases have been coughs, sore throats and rheumatic affections. These were generally not severe, the men usually returning to duty after two or three days. The maladies from which the garrison has suffered have been such as are incident to damp quarters and a variable climate in a remarkably open winter.

Ass't Surgeon J. F. DAY, JR., 10*th Me., Relay House, Md., Dec.* 31, 1861.—We were encamped in a low, damp piece of ground, and the great increase of bronchial diseases during that time indicates that their prevalence was due to the location; another cause was the sudden changes of weather from warm to cold and *vice versa*. These causes also produced the few cases of pneumonia and pleurisy which we have had.

Surgeon J. PASCAL SMITH, 69*th N. Y., near Alexandria, Va., Dec.* 31, 1861.—The quarters of our soldiers are the common A tent, in each of which seven or eight men are crowded. As these tents are wholly unsupplied with boards or straw and the men have but one blanket each to separate them from the damp ground and cover themselves, the predominance of catarrhal and rheumatic affections is easily explained.

Surgeon CHARLES A. DEAN, 89*th Corps d'Afrique, Port Hudson, La., Feb.* 19, 1864.—Pneumonia has been and is now the prevailing disease. It is caused, I think, by living in tents without fire and sleeping without sufficient bedding during the recent cold weather.

Act. Ass't Surgeon CALVIN G. PAGE, 11*th U. S. Inf., Fort Independence, Mass., Oct.* 5, 1861.—There has been one other cause of bronchial trouble, which still continues. The men are furnished with woollen shirts without collars, and there is a space, varying according to the conformation of the man, of from one to two inches between the upper edge of the flannel shirt and the lower edge of the leather neck-stock entirely bare and unprotected by clothing.

Surgeon J. E. SANBORN, 27*th Iowa, Jackson, Tenn., April* 30, 1863.—Most of the respiratory diseases have been bronchial coughs merely, the result of exposure to spring cold and wet, together with an enfeebled condition of the pulmonary capillaries, a sequel of measles. Our limited supply of expectorants has left us little choice in the treatment of these diseases. We have used external remedies largely and internally small doses of ipecacuanha, but particularly a solution of tartar emetic with sulphate of morphia.

Surgeon ENOS G. CHASE, 104*th N. Y., June* 30, 1862.—The regiment was at Kalorama, near Washington, during the first half of April, when diseases of the respiratory system prevailed to a considerable extent owing, I suppose, to sudden changes of temperature and to the fact that hundreds of men had recently recovered from measles and were therefore peculiarly susceptible to these changes.

Surgeon F. H. PECKHAM, 3*d R. I., Fort Wells, Hilton Head, S. C., Jan.* 1, 1862.—Bronchitis has been somewhat prevalent among the officers as well as the men. This, I think, is due in a large degree to the inhalation of dust and minute particles of sand. Owing to the absence of rain for some time past the surface of the ground has become very dry, and the constant movement of troops and teams has kept the atmosphere charged with dust and fine sand.

Surgeon PAUL M. FISHER, 8*th Me., Hilton Head, S. C., Dec.* 31, 1861.—Catarrhs, bronchitis and tonsillitis have been caused by a deficiency of straw to protect the men when sleeping on a soil which has the subsoil water-level within three feet of the surface. But other causes have had their share in their production: The men have not had sufficient clothing day or night; the middle of the day is very warm and the evenings and nights cold; the soil here is sand, and when dry the least wind or motion of men or animals creates a cloud of dust, which induces and aggravates all diseases of the air-passages.

Surgeon JOHN MURPHY, 92*d Corps d'Afrique, Port Hudson, La., Feb.* 19, 1864.—On Jan. 7, 1864, we were ordered to Port Hudson. During a severe storm the men were placed in open cars from Brashear to Algiers. Some fifty or sixty of them had their feet frost-bitten. The regiment was quartered in a machine shop without any conveniences for building fires, and as a result many were severely chilled. From that date pneumonia has prevailed, assuming at an early stage a typhoid character and attended with great mortality. We remained at Algiers from the evening of January 7 until the 12th; we then embarked for Port Hudson, arriving on the 14th. The weather continued cold and wet, increasing our sick report. From that time to the present we have lost fifteen men: Number of cases of pneumonia treated during this period forty-nine; deaths eight.

Surgeon ROBERT K. REID, 3*d Cal., Salt Lake City, Utah, March* 31, 1863.—Bronchitis and catarrhs, pleurisy and pneumonia follow exposure and are persistent and troublesome.

Surgeon W. M. SMITH, 85*th N. Y., New Berne, N. C., Feb.* 22, 1863.—Sickness was greatly increased within ten days after leaving Elmira, [Dec. 3, 1861,] pneumonia, bronchitis and rheumatism being the prevailing diseases. Many of the men had suffered from measles at Elmira, and while in transit to Washington were much exposed in cars destitute of stoves or other warming arrangements. To these causes and the exposed condition of the men for several days after reaching Washington, being unable to procure straw to protect them from the ground at night, is undoubtedly due much of the increase of sickness. * * * A comparison made at the time [shortly after Jan. 29, 1862, when the camp was on Meridian Hill, Washington, D. C.] of the prevailing diseases of regiments that occupied barracks with those that wintered in tents convinced me that while fever was the prevailing and most serious disease of the former, pneumonia was most frequent and fatal in the latter. It appeared to me that the prevalence of pneumonia was greatly encouraged by the arrangements adopted for warming the Sibley tents. The sheet-iron stove in general use for that purpose quickly heats the atmosphere of a tent to a high temperature, which falls rapidly when the fire in the stove goes out. This fluctuation in the atmosphere cannot but greatly contribute to the development of pneumonia. A great majority assumed a typhoid condition. An early and vigorous supporting treatment was adopted with gratifying results. Stimulants were generally found useful and often used very freely in connection with beef-essence.

Surgeon M. R. GAGE, *25th Wis., Camp Randall, Wis., Dec.* 31, 1862.—Rheumatism has been of common occurrence and many of the cases serious. Lying upon the damp ground is no doubt the chief cause, and is nearly certain to cause a recurrence of the disease in those who have at any time previously suffered from its attacks. To these cases, if fever be a dominant symptom, we give first an active purgative of which calomel is an important constituent: then follow with such doses of opium as will quiet the suffering, in combination with calomel as an alterative. When the gums have shown the mercurial trace that remedy is dropped, continuing the opium as before, with small quantities of ipecacuanha, opening the bowels at occasional intervals. When the more acute symptoms have disappeared colchicum is found serviceable, in proper doses, continued with the opiate treatment already instituted. We pay little attention to topical applications in the acute form of rheumatism, believing them to be in fact of no service.

I.—DISEASES OF THE RESPIRATORY ORGANS.

From what has been submitted in the preceding paragraphs it is evident that these diseases were due to conditions of exposure that were avoidable so long as they were uncalled for by the military necessity. Fresh troops had a greater susceptibility to atmospheric influences than those whose experience enabled them to avoid needless dangers and discomforts and to protect themselves more or less when the exposure was unavoidable. As might be expected, therefore, the prevalence and fatality of these diseases were greatest during the first year of the war, after which they became progressively diminished. This, with the greater fatality of the cases among the colored troops, is shown by the following series of rates:

TABLE LIV,

Showing the annual and average annual rates of Sickness and Death from Diseases of the Respiratory Organs, as also the percentage of Fatality of these diseases among the U. S. Troops for the periods stated, expressed in ratios per 1,000 of strength.

WHITE TROOPS.

Diseases of the Respiratory Organs.	Year ending June 30—										Average annual ratio of—		Percentage of fatal cases.
	1862.		1863.		1864.		1865.		1866.				
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
Catarrh*	299.5	.02									299.5	.02	.00
Epidemic catarrh	40.5	.02	92.1	.03	56.1	.01	51.4		22.2		57.4	.02	.02
Acute bronchitis	93.6	.35	99.0	.31	64.4	.27	62.4	.25	53.6	.04	76.8	.27	.39
Chronic bronchitis	13.9	.12	15.7	.29	10.2	.20	10.8	.25	8.1	.10	12.3	.22	1.97
Laryngitis	9.3	.12	9.9	.15	7.4	.08	6.2	.06	4.1	.05	7.9	.10	1.35
Pneumonia	39.6	7.45	34.3	7.23	26.0	6.00	20.3	5.54	9.3	1.75	27.8	6.21	24.06
Pleurisy	18.2	.29	17.3	.25	12.7	.27	12.6	.24	9.1	.08	14.5	.25	1.85
Other diseases	27.5	.96	40.2	.53	20.9	.38	17.9	.40	14.2	.18	26.1	.49	2.02
Total	542.1	9.33	308.4	8.79	197.6	7.20	181.6	6.73	120.7	2.09	265.05	7.56	2.98

COLORED TROOPS.

Epidemic catarrh	88.4	.09	52.7	.01	27.4		53.8	.03	.05	
Acute bronchitis	185.3	2.46	127.7	1.32	66.9	.42	123.5	1.33	1.12	
Chronic bronchitis	20.8	1.09	15.2	.95	9.7	.32	14.9	.78	5.45	
Laryngitis	16.9	.35	17.9	.21	8.8	.09	14.9	.21	1.46	
Pneumonia	181.3	52.30	75.0	25.81	31.7	8.80	88.0	27.29	32.44	
Pleurisy	56.1	3.46	39.5	1.16	24.7	.74	39.1	1.59	4.24	
Other diseases	47.1	1.02	14.1	1.54	8.5	.58	20.5	1.13	5.77	
Total	595.9	61.27	342.1	31.01	177.7	10.95	354.7	32.35	9.54	

Among the CONFEDERATE TROOPS these diseases, as shown by Table XIV,† were of more frequent occurrence than among the Federal soldiers, no doubt because of the comparative scarcity of clothing, blankets and shelter-canvas in their blockaded territory, and of the greater susceptibility of men moved northward from a warmer climate. Pneumonia, for instance, annually affected 103 men of every thousand, while the corresponding rate for our white troops was but 34, and the cases reported as acute bronchitis and catarrhs numbered 415 yearly per thousand of strength as against 192 in the Union ranks.

* Catarrh was removed from the list of diseases on the Monthly Sick Reports June 30, 1862.

† See p. 32

It appears probable, also, that generally these diseases were of as grave a character as among the Federal troops. JOSEPH JONES has published many statistical tables relating to the ratio of deaths to cases in his article on the prevalence and fatality of pneumonia in the Confederate armies;* but in most of these some factor essential to accuracy is wanting. When the calculations are made from the field reports the deaths that occurred after transfer to the general hospitals are omitted: when made from the hospital reports the frequent duplication of cases by the custom of entering every transfer as a new case is an element of fallacy. But among his tables are two which give the needful data: The troops operating in South Carolina, Georgia and Florida during the nineteen months, January, 1862, to July, 1863, inclusive, reported 2,220 cases, of which 127 terminated fatally in the field and 370 in the hospitals, making a total of 497 deaths, equivalent to 22.4 per cent. of the whole number of cases. During the eight months, June to December, 1862, and May, 1863, there were reported in the Army of the West and of Tennessee 3,023 cases of pneumonia, 548 of which proved fatal in the field and 495 after their transfer to general hospitals, making a total of 1,043 fatal cases or 34.5 per cent. of the whole number. These percentages are higher than the actual rates, inasmuch as the cases that occurred in the floating population of the hospitals are not included in the number of cases used in their calculation; but comparisons are admissible, as the Union rates are similarly affected.

The registers of the Chimborazo hospital, which have been freed from duplication of cases, show that in the wards of this institution 37.18 per cent. of the cases of pneumonia and pleurisy proved fatal.†

The mortality of these diseases per thousand of the Confederate strength cannot be obtained, except doubtfully in the instance of pneumonia. By consolidating the various tables published by JONES the deaths caused by this disease during a period of fourteen months in an aggregate strength of 72,617 men may be obtained. In view of the greater frequency of the disease among the Confederate troops and the general gravity of the cases, a higher death-rate per thousand would be anticipated among them than among the white troops of the United States armies.

TABLE LV.

Contrasting the Mortality from Pneumonia in rates per thousand of strength in certain of the Confederate armies and the white commands of the Union army.

Commands.	Strength.	Deaths from pneumonia.	Death-rate per 1,000 for the period.	Annual death-rate per 1,000.
Department of South Carolina, Georgia and Florida, January, 1862, to July, 1863—19 months	25,732	497	19.3	12.2
Confederate forces at Mobile, Ala., January, 1862, to July, 1863—19 months	6,752	151	22.4	14.1
Department of Tennessee, June to December, 1862, and May, 1863—8 months	30,152	1,043	34.2	51.3
Army of the Valley of Virginia, January to October, 1862—10 months	15,582	50	3.2	3.8
Average strength of the above forces for the average period of 14 months	72,617	1,741	24.0	20.6
Union white troops, year ending June 30, 1863	614,325	4,769	7.8	7.8

This table shows a Confederate death-rate of 20.6 per thousand of strength as compared with a Union rate of 7.8; but the difference between the rates was actually greater, for the

* In the Medical Volume, *U. S. Sanitary Commission Memoirs*, New York, 1867.

† See Table XII, *supra*, page 30.

mortality returns from the Army of the Valley of Virginia are incomplete: During the ten months covered by the published statistics of this army 1,034 cases of pneumonia were reported, with only 50 deaths or 4.8 per cent. of the cases; but to this mortality should have been added much of that which was caused by this disease during the period in question at the Staunton hospital, Va., where the ordinary rates of fatality prevailed.

The statistics show also that diseases of exposure were more prevalent and fatal among the PRISONERS OF WAR than even among the colored troops. This was to have been expected, in view of the many hardships and exposures which attended the capture of these men and their transmission to the prison depots, their want of clothing and blankets and the imperfection of the arrangements for their well-being during confinement. The following tabular statement summarizes the information derived from the records of the principal prison depots. Tonsillitis and diphtheria have been embodied in this table as diseases allied to the acute inflammatory affections of the respiratory tract:

TABLE LVI,

Showing the Prevalence and Mortality from certain diseases attributed to atmospheric exposures among the Confederate prisoners held at the principal prison depots in the United States. Average period covered by the observations two years; average strength present 40,815 men.

Diseases.	Total number of—		Average annual rate per 1,000 strength.		Percentage of fatal cases.
	Cases.	Deaths.	Cases.	Deaths.	
Catarrh, epidemic catarrh and acute bronchitis	17,768	58	217.6	0.7	0.32
Chronic bronchitis	1,278	82	15.7	1.0	6.4
Pneumonia	12,210	4,888	149.6	59.9	40.0
Pleurisy	2,109	154	25.8	1.9	7.3
Laryngitis	802	20	9.8	0.2	2.5
Tonsillitis	3,413	13	41.8	0.2	0.38
Diphtheria	450	49	5.6	0.6	10.9
Total	38,030	5,264	465.9	64.5	13.9

The average annual number of deaths from these diseases was 64.5 per thousand prisoners as against 32.35 among our colored troops and 7.56 among our white soldiers. Pneumonia was the fatal disease to which so many of these men fell victims. Its annual death-rate per thousand men was 59.9 as compared with 27.29 among our colored and 6.21 among our white troops. Of every hundred reported cases of pneumonia in these prisons 40.0 were fatal as against 32.44 among the colored men and 24.08 among the white troops. The conditions that contributed to these results have already been explained.*

The annual death-rate from pneumonia and pleurisy per thousand prisoners at Andersonville was seen by Table XVI to have been 27.4. This number is small compared with the rates that prevailed in Northern prisons, and may be regarded as indicating climatic differences; but the accuracy of the diagnosis may well be questioned at a prison where so many died in the enclosure unknown to the medical officers.†

The diagram facing page 722 shows the seasonal character of the catarrhal and pneumonic diseases that have been ascribed to cold and moisture. Their waves of prevalence

* See *supra*, page 70.

† See *supra*, page 39.

agree in their general outline. Their minima correspond with the warmer, their maxima with the colder months of the year.

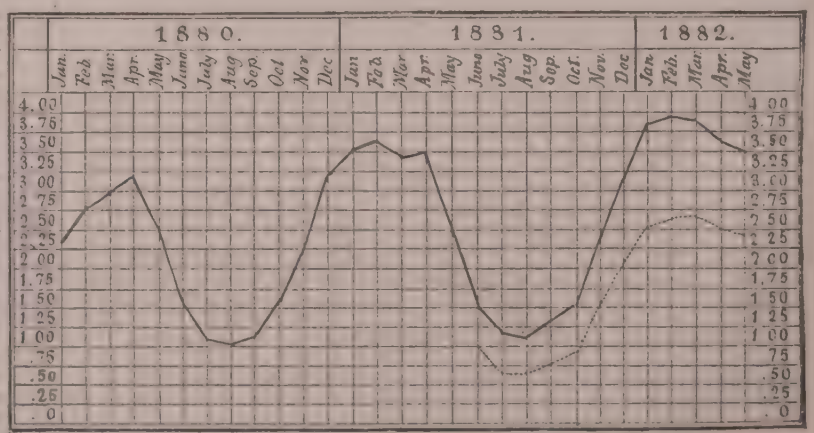
The remarkable prominence of simple catarrh during the only year in which cases were reported under that title was associated with an epidemic of measles. By comparing the rise and fall of its monthly rate with those of the specific disease, as shown in the diagram facing page 650, this catarrh will be recognized as having been a sequel of the eruptive fever: The latter was of frequent occurrence among the new levies during the summer and autumn, but in November its influence became largely extended, and in December it attained its maximum: catarrh followed, reaching its maximum in January. The eruptive fever declined to average rates in February, but these rates were not reached by catarrh until April or May. The less extensive epidemic of measles in November and December, 1862, may be regarded as corresponding with a prominence in the line of epidemic catarrh and the epidemic of March, 1864, as connected with a trivial elevation of the same line.

The regularity of the seasonal waves of prevalence of acute bronchitis is broken, on the diagram, only by a sudden elevation in July, 1862. This is evidently due to the change then adopted in the manner of reporting cases of catarrhal inflammation of the respiratory mucous membrane. The rate of catarrh for June was 8.0, of acute bronchitis 2.2—making a total of 10.2; and in July, corresponding with the exclusion of catarrh from the reports, the rate of acute bronchitis rose from 2.2 to 8.8. The progressive decrease in the size of the waves of pneumonia and pleurisy is well shown in the diagram.

The line indicating the prevalence of tonsillitis, as seen on the diagram facing page 738, presents seasonal elevations corresponding with those already observed in the purely respiratory diseases. Diphtheria, however, had no such marked seasonal accessions. This will be referred to hereafter.

The season of increased prevalence of the diseases mentioned extended from October or November to March or April. Observations on their frequency in civil life in this country have given similar seasonal results.*

The following tabular statement, constructed from data in Dr. JONES' article, already cited, shows the relation of season to the prevalence of pneumonia in the Confederate armies. The disease decreased with the advent of warm weather. The month of July, 1862, fur-



* The following tracing was made from statistics covering the period from January, 1880, to May, 1882, published in the *Bulletin of the National Board of Health*. The facts were derived from the weekly reports of health officers. The population represented was mostly urban and averaged about eight millions. The monthly rates in the tracing are expressed in their equivalent annual rates per thousand of population. The unbroken line indicates the fluctuations in the prevalence of all acute diseases of the respiratory organs, the broken line the corresponding fluctuations of pneumonia, which was reported specially only during the twelve months, June, 1881, to May, 1882. So far as these statistics go they indicate just such a parallelism, as regards prevalence, between pneumonia and the other acute diseases of the organs of respiration as has been shown to have existed among the troops during the war.

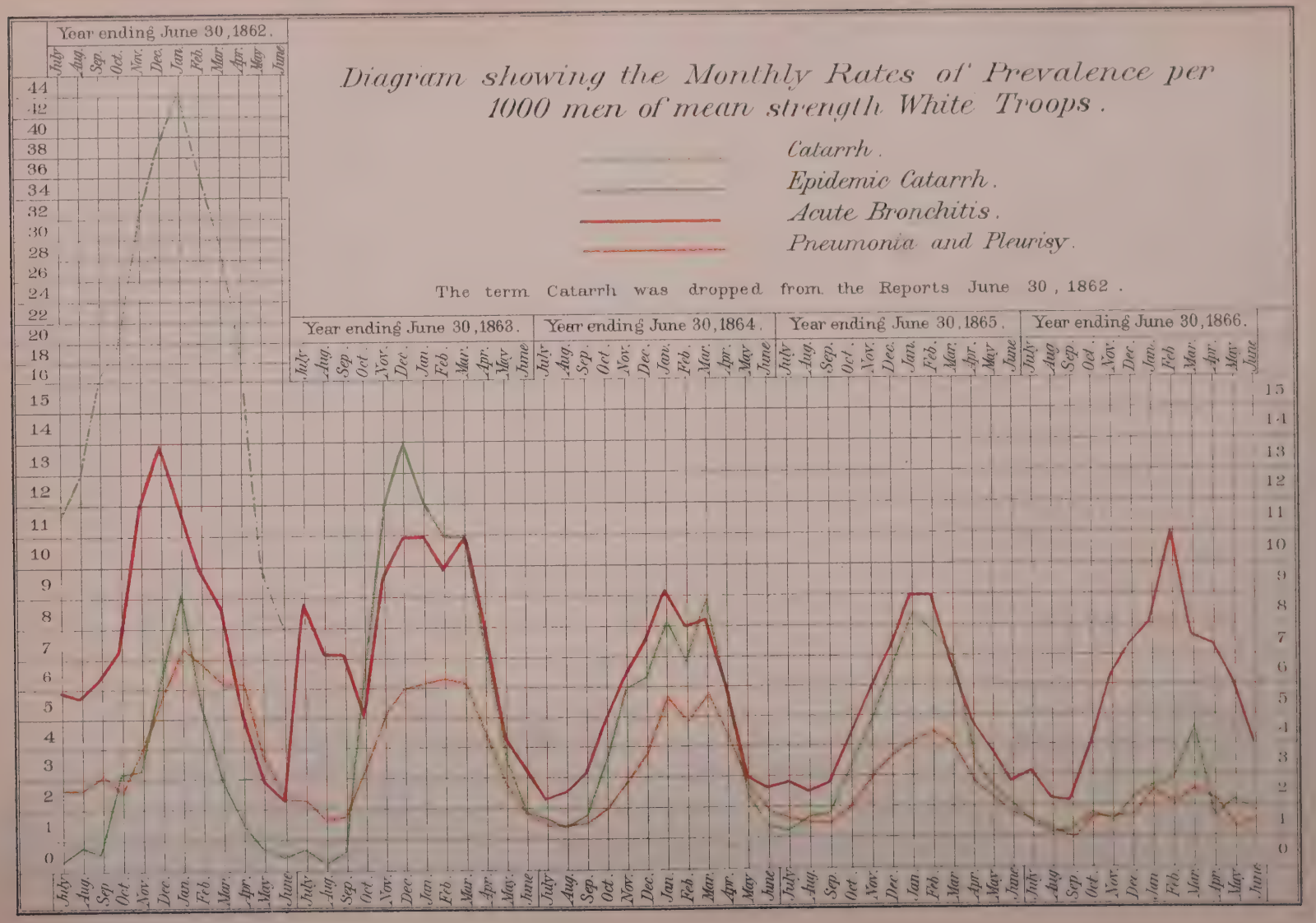


Diagram showing the Monthly Rates of Prevalence per 1000 men of mean strength White Troops.
Catarrh.
Epidemic Catarrh.
Acute Bronchitis.
Pneumonia and Pleurisy.
The term Catarrh was dropped from the Reports June 30, 1862.
Year ending June 30, 1862.
Year ending June 30, 1863.
Year ending June 30, 1864.
Year ending June 30, 1865.
Year ending June 30, 1866.
July Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44

nished an exceptionally high rate. This was noticed by JONES, who, however, failed to give a satisfactory explanation of the anomaly. The monthly rates in this table may be compared with the lines indicating monthly prevalence in the Union Army as shown by the diagram facing page 650.

Month.	Mean strength.	Reported cases of pneumonia.	Ratio per 1,000 of strength.	Month.	Mean strength.	Reported cases of pneumonia.	Ratio per 1,000 of strength.
1862:—January	232,138	3,960	17.05	1862:—November	270,480	2,282	8.43
February	219,069	2,041	9.31	December	172,800	2,985	17.27
March	165,047	1,849	11.20	1863:—January	192,776	2,676	13.88
April	58,304	891	15.28	February	215,408	1,997	9.26
May	58,690	360	6.13	March	313,848	2,816	8.97
June	136,362	881	6.46	April	190,518	1,779	9.33
July	79,999	826	10.32	May	163,711	1,593	9.73
August	113,407	430	3.79	June	107,153	267	2.49
September	125,408	179	1.42	July	72,396	77	1.06
October	156,734	384	2.45				

The well defined connection between pneumonia and low temperatures leads to the expectation that regionic influences would be mainly climatic; but the diversity of the climatic conditions presented by the immense regions—the Atlantic, Central and Pacific—into which the medical statistics of the war were originally consolidated, renders the consolidations valueless from the medico-topographical point of view. The table on page 724 presents the prevalence of catarrhal and pneumonic affections in the several military departments of the regions in figures which admit of comparison.

The average annual number of cases of catarrhal inflammation of the respiratory mucous membrane per thousand of strength did not differ materially in any of the regions. The rates in the Atlantic and Central regions were very similar, and diminished progressively year by year from 448.4 in the former and 420.6 in the latter during the year ending June 30, 1862, to 114.9 and 109.6 respectively during the year ending June 30, 1865; but the rate in the Pacific region, although lower in the first year, owing to the comparative immunity of the troops from measles, was so much higher than those of the other regions during the remaining years as to raise its average rate to a somewhat higher figure than the average of the regions.

Within each region the proportion of catarrhal cases depended in general terms on latitude. In the Atlantic region during the first year the statistics were disturbed by the great prevalence of measles in the Middle Department, which, at that time, was the camping ground of the new regiments awaiting absorption into the army; but during the remaining years the departments which lay north of Washington had, as a rule, larger rates than those which were south of it. In the Central region the Department of the Northwest and the Northern Department had generally larger rates than the Southern commands. In the Pacific region catarrhal affections were more common in the Department of the Pacific, which extended to the Canadian border, than in Colorado, New Mexico and Arizona, which constituted the Department of New Mexico.

But pneumonia, although parallel with the catarrhal affections in its monthly prevalence, diverged from them in its regionic distribution. The rates in the Central region greatly exceeded those that prevailed on its Pacific and Atlantic sides. Latitude was an important factor, for in the Atlantic region the disease, like the catarrhal affections, was more common in northern than in southern commands, and in the Central region the troops

TABLE LVII.

Showing by ratios per thousand of strength the relative frequency of Catarrh of the Respiratory Mucous Membrane and Pneumonia among the white troops of the several Departments and Regions during the four years of war service, July 1, 1861, to June 30, 1865.

Departments and Regions.	Catarrh, Epidemic Catarrh and Acute Bronchitis during the year ending June 30—				Pneumonia during the years ending June 30—			
	1862.	1863.	1864.	1865.	1862.	1863.	1864.	1865.
Department of the East	.....	255.9	250.6	210.1	.....	22.5	46.7	26.9
Middle Department	683.2	246.9	195.2	132.2	33.9	35.1	24.5	26.8
Department of the Shenandoah	390.1	.....	.....	.....	33.2	.....	.....	.....
Middle Military Division	.....	.....	.....	81.9	.....	.....	.....	15.5
Department of Washington	.....	234.5	204.6	123.6	.....	34.1	30.0	19.4
Army of the Potomac	476.2	189.2	96.6	90.2	28.0	18.3	12.9	12.8
Department of the Rappahannock	218.7	.....	.....	.....	20.5	.....	.....	.....
Department of Virginia	399.0	199.6	133.9	162 6	12.7	16.6	13.8	9.4
Department of North Carolina	376.8	266.3	141.1	117.3	20.2	11.7	20.5	27.5
Department of the South	463.0	160.7	170.9	135.4	16.1	5.5	10.1	13.9
Atlantic Region	448.4	205.6	142.4	114.9	26.0	20.7	18.6	15.7
Department of the Northwest	526.6	381.2	172.7	125.0	80.6	121.1	39.3	34.1
Northern Department	.....	419.8	306.2	311.1	.....	64.1	111.8	69.0
Department of West Virginia	512.2	208.1	111.3	.....	38.6	46.7	16.2	.....
Department of Missouri	482.2	188.3	220.1	166.5	120.7	57.2	69.1	36 1
Department of the Ohio	.....	171.1	119.3	.....	.....	58.7	37.7	.....
Department of the Cumberland	483.0	172.7	80.2	.....	60.0	45.7	19.5	.....
Department of the Tennessee	266.6	159.0	73.5	.....	56.3	46.7	25.9	.....
Military Division Mississippi, Part I	.....	.....	.....	127.4	.....	.....	.....	27.8
Military Division Mississippi, Part II	.....	.....	.....	39.1	.....	.....	.....	9.4
Department of Arkansas	.....	.....	132.1	137.9	.....	.....	40.4	26.3
Department of the Gulf	235.5	148.4	67.9	80.0	19.0	14.7	14.4	13.5
Central Region	420.6	176.4	105.6	109.6	64.7	47.1	30.4	23.4
Department of New Mexico	109.0	254.1	197.7	91.1	11.3	20.7	14.9	27.4
Department of the Pacific	398.3	234.8	222.2	260.4	21.1	8.9	17.1	27.4
Pacific Region	258.5	242.6	212.3	205.1	16.3	13.7	16.2	27.4
Total	433.6	191.0	120.5	113.8	39.6	34.3	26.0	20.3

in the Department of the Gulf enjoyed an immunity from the disease as compared with those in the Northern departments. Apparently the principal cause of the high rates of the Central region was the great frequency of pneumonic cases in the Departments of the Missouri, Ohio, Tennessee and Cumberland, particularly during the first and second years. These cases were probably the effects of the continued exposure to cold and wet necessitated by the military operations which opened up the Mississippi river. Later, as when the armies were operating against Atlanta or crossing the country to the Atlantic coast, the pneumonic rate became much reduced; but as the troops under General Sherman, in their march across Georgia, had a rate of only 9.4 per thousand, while those left with General Thomas continued to have a rate similar to those of the Departments of the Missouri and Arkansas it seems as if along the great lines of drainage of this vast central region the causes of pneumonia had been more potent than on the ocean slopes or western prairie lands.

The Confederate statistics appear to confirm this deduction, for while the Army of the Tennessee, which served in the States of Tennessee, Kentucky, Alabama and Mississippi,

had an average annual rate of 173.1 pneumonic cases per thousand of strength, as calculated from the statistics submitted by Dr. JONES, the troops in South Carolina, Georgia and Florida had but 54.5, those in the Valley of Virginia 79.6 and those around Mobile, Ala., 108.6.

I.—CATARRH.

During the fourteen months, May, 1861, to June, 1862, inclusive, 85,677 cases of catarrh, six of which terminated fatally, were reported among the white troops. No particulars of these cases have been recorded. On the date last mentioned the term *catarrh* was dropped from the Monthly Reports of Sick and Wounded. Subsequently cases which, according to custom, would have been reported under this title, appear, from the diagram facing page 722, to have found place under the heading *acute bronchitis*.

II.—EPIDEMIC CATARRH.

A large number of cases were reported under this heading—134,397 among the white and 9,869 among the colored troops. Nevertheless, as these cases were distributed fairly among the various commands and throughout the several years covered by the statistics, giving an annual average rate of 61.4 per thousand of strength among the white and 53.8 among the colored troops, it may be doubted whether the disease thus reported was in reality that for which the heading was provided. In fact the cases appear to have been occasioned by local rather than epidemic influences. During the winter-quarters of the Army of the Potomac, 1863–4, the forty-five or more regiments of the Second Army Corps were hutted near Cole's Hill, Stevensburgh, Va. Four of these regiments reported the existence of epidemic catarrh, while others had only occasional cases of acute bronchitis, and a few belonging to the Second Division, which was quartered on a high and rather exposed hill-side, were absolutely free from sickness. The four regiments affected with the so-called epidemic catarrh were encamped on low-lying and damp ground. The principal sufferer, the 148th Pa., reported 55 cases in January, 70 in February and 54 in March. Its camp-ground was trampled into deep mud by the men in the routine of their daily duties. Their feet were constantly damp and cold and their spirits depressed. The regiment, nevertheless, labored earnestly to improve its condition. The huts were floored with split logs; sidewalks of the same material were built on the company streets over deep trenches which drained the building sites, and pathways were laid to keep the men dry-shod in all the ordinary movements of the regimental domestic economy. In fact the command raised itself above the mud of its camp-site. As a result of this energetic work the catarrhal epidemic ceased; no case was reported in April. In May of the same year the 2d N. Y. Heavy Art'y returned 150 cases of epidemic catarrh, or nearly one-half of the total of 322 cases reported as having occurred among the 115,385 men constituting the strength of the Army of the Potomac; and in June this regiment returned 41 of the 63 cases reported from a strength of 98,384. The regiment was new to field service. During the previous winter it had occupied the fortifications of Washington, D. C.; but in May it was relieved and sent to the front when the battles of the Wilderness, Spottsylvania and Cold Harbor were in progress. Its raw material, under the exposures of the bivouac, became affected with catarrh associated with great disturbance of the system and unusual prostration, which was due rather to the unaccustomed fatigues and privations undergone by the men than to any epidemic influence.

It seems probable, indeed, that most of the reported cases were of a character similar to those mentioned,—endemics of simple catarrh originating in faulty camping grounds or local epidemics due to unwonted exposures.

Surgeon ORPHEUS EVERTS, 20*th Ind., Poolesville, Md., Oct.* 24, 1862.—Soon after camping at Fortress Monroe [Sept. 25, 1861] an epidemic of influenza appeared in the regiment, which I learned had affected the 1st Del.,* encamped close by, before our arrival, and from which but few escaped being more or less affected. The cough was violent and very persistent, but attended with little constitutional disturbance. The men suffered more from loss of sleep on account of the annoyance of the cough and muscular soreness from the violent exercise of the respiratory muscles than from any febrile or other disturbance of the system. Remedies administered seemed to make but little impression on the cough. All the usual formulæ were tried.

Surgeon D. MINIS, 48*th Pa., Camp Clark, Va., Nov.* 30, 1861.—About the end of October, while encamped at Camp Hamilton, near Fortress Monroe, an epidemic catarrh made its appearance amongst us. Nearly every man in the regiment was more or less affected by it. My report exhibits but a limited number of those attacked, only those cases of grave character coming under our official notice. The disease was characterized by severe aching, throbbing pains in the head, back and limbs, bronchial inflammation and hepatic disorder. It yielded readily to moderately large doses of sulphate of quinia and Dover's powder in combination; but in all its severer phases was followed by unusual physical debility and tedious convalescence.

Surgeon EZRA READ, 21*st Ind., Fort Marshall, Baltimore, Md., Jan.* 14, 1862.—In December catarrh prevailed in an epidemic form and was attended with great irritation of the pulmonary mucous surfaces, headache and fever. Anodynes and aperients were the remedies relied upon and afforded as much relief as could have been expected: depleting measures were not indicated. The disease prevailed for three weeks and had an average duration of about eight days in each case. Loss of appetite, lassitude, debility, headache, pain in the frontal sinuses and cough were its prominent symptoms.

Surgeon SAMUEL KNEELAND, 45*th Mass., New Berne, N. C., Feb.* 19, 1863.—A kind of influenza prevailed in December among the officers and men, rebellious to treatment and disappearing spontaneously.

Surgeon L. M. SLOANAKER, 19*th Iowa, Brownsville, Texas, April* 20, 1864.—These [cases of catarrh] were uncomplicated with bronchitis or pneumonia, and may all be considered dependent upon epidemic influenza. Many were quite tedious, and two resulted in permanent partial loss of speech. The largest number occurred in March, while the regiment was at Forsyth, Mo., on White river,—a location which is low and damp and hence favorable to catarrhal affections.

III.—ACUTE BRONCHITIS.

The statistics hold this disease responsible for the occurrence of 168,715 cases of sickness, of which 650 terminated fatally among the white troops. This, as has been seen in Table LIV, is equivalent to an average annual rate of 76.8 cases and .27 deaths per thousand of strength and to .39 fatal cases in every hundred. Among the colored troops 22,648 cases and 255 deaths are reported, giving an average annual rate of 123.5 cases and 1.33 deaths and a rate of fatality amounting to 1.12 per cent. of the cases.

Only six cases of this disease appear in the case-books. Four offer no points of interest; the two others, recorded by Act. Ass't Surgeon H. C. NEWKIRK, were treated at Rock Island hospital and, it is said, with benefit by inhalations of ether, chloroform, turpentine, etc., with the subsequent occasional use of an expectorant mixture of squill and senega.

In addition to these cases, which recovered, there are ten deaths in the progress of or subsequent to measles, the records of which present bronchitis as the principal abnormal condition. The brain was examined in but one of these cases; the weights of the liver, spleen and kidneys were stated, and remarks made on the condition of the intestines, while the thoracic observations were recorded briefly as having shown the existence of bronchitis. Possibly, in some of these instances, the influence of the specific poison destroyed life while the lesions within the chest were limited to the bronchial mucous membrane; but as nine

* D. W. MAULL, Surgeon 1st Del., has given an account of this epidemic in the *Medical and Surgical Reporter*, Philadelphia, Vol. VII, 1861–62, p. 169.—While the affection of the respiratory passages was not generally severe, although sometimes attended by uneasiness in the chest and expectoration of blood, the disease was marked by a severe and almost invariable pain in the frontal region, which sometimes extended over the whole head, by pains in the loins, aching in the lower extremities and pain in the neck and arms. Intestinal disorder was also prominent, evinced by severe diarrhœa with [illegible] There was great debility, but the febrile disturbance was not great. Surgeon MAULL states that thirty-five men of his regiment reported for treatment in one day. The epidemic continued more than two weeks.

of them occurred at the same hospital about the same time, and were probably recorded by the same officer, it is not unlikely that in the overpressure of work the lobular atelectasis and congestion which would have placed them among the secondary pneumonias were not recognized. Cases 1–9 are from the records of Hospital No. 1, Nashville, Tenn.; case 10 occurred at Chattanooga hospital, Tenn.

CASE 1.—Private Baker Parham, Co. H, 2d East Tenn. Cav.; admitted March 2, 1864, with bronchitis consecutive to measles. Died 3d. *Post-mortem* examination: The bronchial tubes were highly inflamed and contained muco-pus. The heart was filled with unusually large light-yellow clots weighing six ounces; the heart, without the clots, weighed fourteen ounces. The liver weighed eighty ounces; the spleen and kidneys were healthy. The mucous membrane of the intestines was slightly inflamed throughout.

CASE 2.—Private Samuel Cowan, Co. K, 17th Ohio; age 18; admitted March 6, 1864, with measles. Died 10th. *Post-mortem* examination: There was extensive bronchitis on both sides. The liver was fatty and weighed seventy-four ounces; the spleen weighed ten ounces. The kidneys and intestines were healthy.

CASE 3.—Private Joseph Stacey, Co. H, 5th Iowa Cav.; age 18; admitted March 6, 1864, with measles. Died 20th. *Post-mortem* examination: There was intense bronchial inflammation on both sides. The pericardium contained three ounces of liquid. Nothing else unusual was observed in the thorax or abdomen.

CASE 4.—Private Samuel R. Davis, Co. E, 12th Tenn. Cav.; age 21; admitted March 7, 1864, with measles. Died 17th. *Post-mortem* examination. The bronchial mucous membrane was extensively inflamed. The heart contained large light-colored clots. The liver weighed seventy-two ounces; the spleen fourteen ounces. The kidneys and intestines were normal.

CASE 5.—Private William Taylor, Co. F, 2d East Tenn. Cav.; age 30; admitted March 9, 1864, with measles. Died 9th. *Post-mortem* examination: There was some bronchitis, but the lungs were otherwise healthy. The liver weighed sixty-nine ounces; the spleen seven ounces and a half. The ascending colon, cæcum and lower third of the small intestine were inflamed and of a mahogany color. The kidneys appeared normal.

CASE 6.—Private Sylvanus W. Davis, Co. C, 76th Ohio; age 19; admitted and died March 24, 1864. *Post-mortem* examination: Large livid spots on face, neck and trunk. Seventy-two ounces of sero-bloody fluid in left pleural cavity, two ounces in right; lungs much congested and bronchial mucous membrane highly and extensively inflamed. Heart nine ounces; liver forty-nine ounces; spleen seven ounces; kidneys, each, four ounces—all healthy. Small intestine slightly inflamed.

CASE 7.—Private Jacob Eddleman, Co. D, 2d Ind. Cav.; admitted March 24, 1864, with measles. Died 31st. *Post-mortem* examination: The bronchial tubes of both lungs were inflamed. The liver weighed seventy-seven ounces; the spleen eleven ounces. The other organs appeared normal.

CASE 8.—Private George Carder, Co. I, 31st Ohio; age 17; admitted March 25, 1864, with measles. Died 29th. *Post-mortem* examination: The bronchial tubes of the lower lobes of both lungs were inflamed. No other marked lesion was observed in the thorax or abdomen.

CASE 9.—Private Joseph A. Granell, Co. H, 7th Pa. Cav.; age 17; admitted March 27, 1864, with measles. Died April 2. *Post-mortem* examination: The large bronchial tubes on both sides were greatly inflamed. There were firm clots in the right cavities of the heart. The right kidney was of a dark coffee-color, but otherwise the abdominal viscera were healthy.

CASE 10.—Private J. F. Gensel, Co. I, 46th Ohio; age 29; was admitted March 19, 1864, with measles. On the disappearance of the eruption, on the 24th, cough set in with muco-purulent expectoration. On the 27th the patient had an aphthous mouth and diarrhœa, accompanied on the 29th by a good deal of fever, the tongue being dry and fissured; mucous râles were heard on both sides of the thorax. Two days later erysipelas made its appearance on the nose; the diarrhœa had ceased, but the patient was nervous and anxious. Delirium supervened on April 1, and death by coma next day. *Post-mortem* examination: The membranes of the brain were injected. The pleura and the parenchyma of the lungs were normal; the mucous membrane of the bronchial tubes was red and contained a quantity of muco-purulent secretion. The heart was normal. The mucous membrane of the stomach was mottled with bright-red spots. The colon was injected and presented a number of ulcers, most numerous toward the rectum.

Among the *post-mortem* records of pneumonia are a number of instances of acute bronchitis fatal by the supervention of lobular inflammation.* One instance of plastic bronchitis has been found:

Private Daniel Boren, Co. K, 96th Pa.; admitted Jan. 2, 1863. Diagnosis: Hemiplegia. Died February 2. *Post-mortem* examination: Rigor mortis well marked; emaciated; veins full of blood. Brain, forty-nine ounces and a half, full of blood; choroid plexus pale, but its largest vessels full and tortuous; veins of pia mater injected; veins of pons and medulla full of blood; gray matter apparently diminished in amount; striæ of pons marked. Right lung forty-two ounces; pigment deposit on pleura in intercostal spaces; coagulable lymph on upper and middle lobes, which were firmly adherent and consolidated in the vicinity of the adhesions; remainder of the lung much congested; in the large bronchial tube leading to the consolidated mass was a fibrinous plug one and a half inches long, filling the

* See *infra*, page 783.

lumen; surface of tube mottled white and red. Left lung healthy. Heart, seven and a half ounces, firm; small clot in each ventricle. Liver, forty-nine ounces, dark, friable; spleen, four and three-quarter ounces, much congested, firm. Colon congested.—*Lincoln Hospital, Washington, D. C.*

The only paper referring to the treatment of acute bronchitis is as follows:

Surgeon M. R. GAGE, *25th Wis., Columbus, Ky., March* 31, 1863.—A number of cases of acute bronchitis have occurred. It is treated in severe cases by cupping, repeated, if necessary, to relieve urgent symptoms. Counter-irritation by mustard is found beneficial. The bowels are acted upon by podophyllin, bicarbonate of soda and calomel, and this is followed by tartar emetic *ad nauseam*, as in pneumonia. If symptoms of debility and prostration ensue resort may be had to stimulating expectorants and to carbonate of ammonia, beef-tea, wine, etc.

But the medical descriptive lists indicate that Dover's powder, spirit of nitre, neutral mixture and ipecacuanha were the remedies generally employed.

IV.—CHRONIC BRONCHITIS.

There were reported among the white troops 26,912 cases of chronic bronchitis, of which 529 or 1.97 per cent. had a fatal ending, giving the annual rates of 12.3 cases and .22 deaths per thousand of strength, while the number disposed of by discharge for disability amounted to 3,729 or 13.9 per cent. of the cases. Among the colored troops 2,733 cases and 149 deaths were reported, or 14.9 cases and .78 deaths annually per thousand of strength,—the rate of fatality amounting to 5.45 per cent. of the cases; discharges among the colored troops, as already explained,* were comparatively rare.

Notwithstanding the prevalence of this diseased condition, and its importance as a cause of disability, twenty-three cases only have been discovered in the hospital case-books. The frequency of the affection and its freedom from immediate danger to life probably account for the want of interest displayed in the preservation of its records. From the meagre data at command little can be said by way of generalization. The symptoms noted are more or less cough with an expectoration scanty and glairy, whitish, frothy and mucous, sometimes streaked with blood, or, more profuse, yellow and muco-purulent; pain in the chest, but generally only on coughing; palpitation, shortness of breath and paroxysmal cough on exertion. The tongue was usually coated, although the bowels might be regular. The pulse was frequent and weak. The body was sometimes fairly nourished and the appetite good, but more frequently there was some emaciation and in advanced cases hectic fever. The chest resonance was normal or increased; the respiratory murmur was sometimes obscure, but generally harsh and prolonged in expiration; mucous, sonorous and sibilant râles were frequently noted. From these observations the condition of the bronchial mucous membrane may be appreciated as congested and swollen, with more or less hypersecretion and increased corpuscular development, occasional obstruction of the tubes and emphysematous dilatation of the air-cells.

Usually these cases had lasted for months before their appearance on the record. Medication for a time was followed by no marked benefit. Expectorants were given, compound liquorice mixture, squill, senega, ipecacuanha, etc.; chloride of ammonium was also employed; wild-cherry was largely used as a tonic and to allay bronchial irritation, for which it was given with morphine and chloroform. In addition the chest was blistered, or counter-irritation was kept up by emplastrum picis cum cantharide, croton oil or iodine. Extra diet, quinine and iron, cod liver oil, porter or whiskey were also generally prescribed, with aromatic sulphuric acid in the presence of hectic. In progress of time an improvement was manifested, the patient gaining in flesh and strength, but prone to dyspnœa and cough on exertion and to a recurrence of his trouble on slight exposure. Furloughs enter into the

* See supra, page 28.

medical history of many of these cases, while others were placed on light duty in the wards or kitchens of hospitals. Many recovered and returned to duty, and their names do not reappear on the sick-reports from this cause. Others were ultimately transferred to the Invalid Corps or discharged as unfit for service. Although the statistics show that a notable percentage of these bronchitic cases died, in but two instances do the case-books record the progress to a fatal issue,—in one death appears to have resulted from the sudden development of pulmonary congestion, and in the other from the supervention of laryngitis.

CASE 1.—Private Joseph Hawkins, Co. K, 19th Colored Troops; age 24; was admitted Sept. 29, 1864, with chronic bronchitis. Cod-liver oil, iron, stimulants, expectorants and dry cupping were used in the treatment, with iodide of potassium and volatile liniment when complaint was made at times of rheumatic pains. He seemed to be improving steadily when, on Jan. 18, 1865, he was taken with a pain in the left side of the chest and symptomatic pyrexia; a blister was applied. Next day he said he felt better; he got up and dressed; he died within an hour afterward. *Post-mortem* examination: The left lung was decidedly congested.—*Summit House Hospital, Philadelphia, Pa.*

CASE 2.—Private Christopher Wagner, Co. E, 61st N. Y.; admitted Aug. 9, 1862. Bronchitis. Died Sept. 7th, with symptoms of acute laryngitis. *Post-mortem* examination: Body vigorous; age about 35. Adhesions of the right lung throughout, also at middle portion of upper lobe of left lung; both lungs somewhat congested with black blood. Mucous membrane of the air-passages, larynx included, inflamed and the cricoid cartilage ossified and carious. The heart was rather large, fatty and flabby; left ventricle dilated, walls about half an inch thick; one of the aortic valves thickened by an opaque yellowish-white deposit. Spleen large and softened; the remaining abdominal organs healthy.—*Act. Ass't Surgeon* J. LEIDY, *Satterlee Hospital, Philadelphia, Pa.*

V.—ASTHMA.

This was, comparatively, an infrequent disease. During the five and one-sixth years covered by the statistics there were reported 9,365 cases among the white troops, or about four cases annually in every thousand men; but as only 1,220, or about one-eighth of the number, were discharged from the service as unfit for duty, it may be inferred that in general the bronchial spasm was amenable to treatment. The records, however, throw little light on this subject. They are few and meagre, consisting of but six imperfect cases: In two of these the origin of the disease is ascribed to exposure in cold and rainy weather. A slight attack of bronchitis was associated with the onset in two cases, while in one every paroxysm was preceded by a chill. In one case the patient was affected with tape-worm, but its expulsion, by means of turpentine, produced no beneficial effect on the asthmatic trouble. In another case the patient had been subject to the disease from childhood. Treatment was continued in four of the cases for the respective periods of four, seven, nine and nineteen months, but without notable or permanent benefit to the patients. Tonics, as quinine and iron, sedative expectorants and counter-irritants were employed. Chloroform entered frequently into the prescriptions given to prevent or cut short the attacks,—three to five drops in mucilage or with extract of wild-cherry or expectorants. During an attack small and repeated doses of wine of ipecacuanha were sometimes administered. Mustard was used to produce counter-irritation. In one instance iodide of potassium and extract of hyoscyamus appeared to exercise a marked influence on the conditions that occasioned the bronchial spasm:

FREDERICK WILKESSON, Co. C, 84th Ill.; age 24; was admitted Dec. 2, 1863, with a gunshot wound of the left hand and asthma. The wound was received at Chickamauga Sept. 20, 1863, and was healed at the date of admission; but the patient had frequent attacks or paroxysms of asthma. Ordered iodide of potash and extract of hyoscyamus, with fluid extract of cinchona, three times a day, and light diet. He had no paroxysm after he commenced taking this preparation and was sent to his regiment March 22, 1864.—*Hospital, Quincy, Ill.*

In one of the four cases that were continued so long under treatment a mixture containing iodide of potassium, hyoscyamus and lobelia appeared to have a good effect for six or seven days, but the patient at the end of this period went on a drunken frolic and the asthma became thereafter much aggravated. One case was relieved by stramonium:

Private Thomas L. Rea, Co. I, 2d Ill. Cav.; age 29; was admitted Sept. 23, 1863, with asthma, with which he had been affected since the winter of 1861. His rest at night was much disturbed and his mind depressed by frequent paroxysms of urgent dyspnœa; his appetite was fair. He had a cough but no expectoration. Gave stramonium to smoke; full diet. Oct. 29: Patient rested at night without sitting up in bed; he feels better generally. Nov. 25: Transferred to Veteran Reserve Corps.—*Hospital, Quincy, Ill.*

VI.—INFLAMMATION OF THE LARYNX.

Although the records make frequent mention of laryngeal inflammation as a complication of other diseases, there are but eleven cases of death specially attributed to this cause, concerning which some details have been preserved. The 17,318 cases reported as having occurred among the white troops consisted, no doubt, largely of mild catarrhal attacks, of chronic thickening marked by hoarseness or aphonia, and of some which might with propriety have been referred to syphilis or tuberculosis; but the 234 fatal cases—a mortality of only 1.4 per cent.—may be considered as fairly represented by these eleven cases. The attack was generally sudden and induced by exposure to cold and dampness, especially if the individual was in low condition, as during convalescence from some serious malady. The throat became sore, the voice hoarse and the larynx, trachea and cervical glands swollen and tender. There was much pain and difficulty in swallowing and a rapidly increasing dyspnœa, with inspiration more difficult than expiration. The patient sat up in bed with his head thrown back, and in his struggle for breath his respiration and pulse became accelerated. Sometimes a chill, followed by active febrile manifestations, preceded or accompanied the local inflammation. In the progress of the case the imperfect æration of the blood became indicated by the dusky complexion and blueness of the lips and finger-nails; the anxious expression disappeared and insensibility deepened into coma and death, or the fatal termination was suddenly reached by an occlusion of the glottis.

The rapidly fatal result of laryngeal stenosis is seen in case 2, in which the interference with respiration was due to the presence of plastic lymph, whether in or on the mucous membrane is uncertain. The conditions in 5 and 6 are equally uncertain,—the fibrinous exudation is said to have been under the folds of the glottis. In 1 œdema is assumed as the cause, but free incisions failed to collapse the swollen membrane; in 8–11 the closure was due to œdema; in 7 the larynx appears to have been implicated by an extension of the diseased action from the pharynx.

So long as the dyspnœa depended mainly on narrowing of the laryngeal passage an artificial opening gave an assurance of safety,—case 1 illustrates the rapid improvement effected by the entrance of air into the lungs; but, when the pulmonary stasis ended in an œdematous permeation of the tissues, laryngotomy was obviously of no avail. Even when the lungs were free from effused or exuded matters the operation was sometimes unsuccessful if delayed until the nervous centres had become affected by the depraved quality of the blood, as in cases 2 and 9. In case 3, in which tracheotomy failed to save life, although the lungs were found in normal condition after death, we are probably not in possession of all the circumstances bearing on the result.

Treatment, aside from opening the tube below the constriction, was of doubtful value in these dangerous cases. Scarification gave temporary relief but failed to cure. Warm moist inhalations and gargles were employed, with hot fomentations externally or counter-irritation, as by iodine or cantharidal collodion. Active cathartics and free doses of iodide of potassium were unavailing in case 4. Chlorate of potash was administered in 5, probably in the hope of supplying oxygen to the blood.

Case 1.—Private Samuel Frosh, Co. F, 1st Pa. Heavy Art'y; age 21; a well-formed, healthy-looking young man, was admitted March 24, 1864, under Dr. John H. Bartholf, with pleuro-pneumonia of the left side. During his convalescence from this attack he was absent without leave on April 9, a chilly rainy day. On the 10th he had sore throat with much dyspnœa and occasional strangling in attempting to swallow; the larynx and trachea were tender and there was slight redness in the throat. A gargle and hot fomentations were ordered. 12th: He slept but little during the night; the front of the neck was swollen and tender and swallowing caused much pain; there was no cough, but the voice was whispering, the respiration difficult, the countenance anxious and the head thrown back. The fauces were reddened and the epiglottis cushiony, yellowish-red and shining as if from effused serum. The mucous membrane was incised, the vapor of warm water inhaled and tincture of iodine applied externally. The incisions gave so much relief that the patient asked to have them repeated. 13th: At midnight he had a severe paroxysm of dyspnœa, inspiration being more difficult than expiration; he sat up in bed sucking in the air, with an anxious face and dull-colored lips and finger nails. The apex of the epiglottis was in better condition than on the preceding day, but the remainder of the organ was unchanged. At 3 A. M. incisions were made in the swollen membrane and repeated many times until daylight, but they did not give satisfactory relief. The pulse was 120. Cantharidal collodion was applied to the front of the neck and thirty drops of laudanum given; warm-water vapor and warm-water gargles were used. At 9 A. M. the pulse was 128 and the patient weak. At 11 A. M. he was worse. A consultation was held; a strong solution of nitrate of silver was applied to the larynx. At noon he was much worse; his pulse 136, respiration 35, countenance dusky, nails bluish and his muscular power so affected that he slipped down in bed. Dr. R. F. Weir, surgeon in charge, made an incision through the crico-thyroid membrane, the cricoid cartilage and one or two rings of the trachea; a double tracheal tube was inserted and a warm moist sponge with a folded piece of mosquito netting placed over the opening. Two teaspoonfuls of blood, mostly venous, were lost. The dyspnœa was immediately relieved and the livid color lessened. In half an hour the pulse fell to 120, the respiration to 34, and soon after the patient dropped into a doze which lasted the entire afternoon. In the evening he asked for food; beef-tea was given. At 6 P. M. the pulse was 112. He passed a good night. 14th: The pulse was 92. Liquid food was given. He was directed to use the larynx as much as possible in respiration by putting his finger on the mouth of the tube. 15th: He passed a good night but had a red flush on his cheeks and a stitch in each side, with slight cough; pulse 100. He breathed much through the larynx without closing the tube. 16th: The thoracic symptoms have disappeared; pulse 90; appetite good. 18th: The tube was removed. 19th: The orifice was nearly closed, no air escaping. May 3: He was still somewhat hoarse; the granulating surface at the site of the incision was nearly cicatrized. He was returned to his company to receive a re-enlistment furlough. June 9: He called at the hospital. His voice was still rough; in hallooing the note was not clear; in shouting there was a high-pitched squeaking noise; he was otherwise perfectly healthy.—*Hospital, Frederick, Md.*

Case 2.—Samuel Mitchell, Co. C, 12th U. S. Inf., was affected with sore throat during his convalescence from typhoid fever. On Oct. 4, 1862, at 3 P. M. respiration became embarrassed and he grew rapidly worse; at 4 P. M. the neck was swollen, especially on the right side; there was dyspnœa, coldness of extremities and insensibility. Laryngotomy was performed and respiration through the artificial opening was free, but in about fifteen minutes he died. *Post-mortem* examination: Tonsils deeply eroded; epiglottis firm from effusion of plastic lymph, which effusion was also marked about the vocal chords, especially on the right side. Lungs congested.—*Hospital, Frederick, Md.*

Case 3.—David R. Zimmerman, Co. C, 7th S. C.; age 30; was admitted at noon April 9, 1864, with croupy breathing, dusky countenance and blue lips. Sonorous and subcrepitant râles were heard over both lungs; the epiglottis, tonsils and surrounding parts were much swollen. Tracheotomy was performed one hour after admission and a quill tube was inserted, through which he breathed freely and with marked improvement until 2 o'clock of the succeeding night, when he had a severe chill and rapidly sank, dying at 8 A. M. April 10. *Post-mortem* examination: Thickening and enlargement of the epiglottis and tonsils; fibrinous exudation under the folds of the glottis, producing almost complete closure. Lungs normal.—*Act. Ass't Surgeon M. K. Gleason, Rock Island Hospital, Ill.*

Case 4.—Marion Evans, Co. G, 2d Ark. Cav.; age 26; temperate and free from constitutional taint; was taken suddenly with a violent chill while attending roll-call on the evening of Sept. 25, 1864. High febrile excitement followed, with intense headache and pain in the back and limbs; next day he had sore throat, enlarged glands, aphonia and difficult deglutition. On admission on the 27th his countenance was suffused and anxious, breathing loud and distressingly labored, respiration 30; he preferred the sitting posture and kept his head thrown back. His cough was dry and croupy; pulse 120, hard and full; tongue coated; skin dry and hot; throat swollen and tender. Croton oil was given internally and applied externally to free pustulation. The pharynx was swabbed with nitrate of silver solution. After catharsis ten grains of iodide of potash were given every four hours. He died suddenly, September 28, after an attempt to rise from bed. *Post-mortem* examination: Parotid and submaxillary glands greatly enlarged; epiglottis swollen and exuding pus on puncture; three drachms of sero-purulent liquid in the larynx, the chink firmly closed. [*Specimen* 652, Army Medical Museum.]—*Act. Ass't Surgeon M. K. Gleason, Rock Island Hospital, Ill.*

Case 5.—James B. Lloyd, Co. C, 9th Fla.; a plethoric man; age 35; was admitted April 3, 1864, with fever, croupy breathing and pain over the larynx; the fauces were inflamed and the submaxillary region swollen and tender. He became very restless and delirious. He was treated with cathartics, chlorate of potash internally and iodine externally. He died April 5. *Post-mortem* examination: Swollen condition of glottis from fibrinous exudation.—*Act. Ass't Surgeon M. K. Gleason, Rock Island Hospital, Ill.*

Case 6.—Joshua Watson, Co. C, 7th Fla.; age 40; was admitted March 22, 1864, in a very debilitated condition, having been sick for some time with typhoid fever; his tongue was dry, teeth covered with sordes, countenance dull and expression vacant. On March 25 he was suddenly attacked with acute laryngitis and died on the same day.

Post-mortem examination: Peyer's patches congested, thickened and ulcerated. Glottis and surrounding parts congested and swollen, with fibrinous exudation.—*Act. Ass't Surgeon M. K. Gleason, Rock Island Hospital, Ill.*

Case 7.—Private Asa C. Wentworth, Co. H, 19th Me.; admitted Nov. 26, 1863; died Jan. 12, 1864. *Post-mortem* examination: The velum palati was hard, stiff and white; the tonsils in normal condition. Pharyngitis was present, especially on the right side. Opposite the right arytenoid cartilage a large abscess, with hard, yellowish-white walls, was observed, and the cartilage itself was the seat of a large protuberance, probably a collection of pus. This swelling and the abscess of the pharynx explained the difficulty of deglutition observed during life. A small collection of pus was seen on the opposite side of this region immediately above the greater horn of the hyoid bone. The epiglottis and vocal chords were œdematous and yellowish-white. The heart was soft and the liver bronzed and mottled with hard lardaceous spots. [The condition of the lungs is not stated.]—*Ass't Surgeon H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 8.—Corporal Samuel Dillingham, Co. H, 24th V. R. C.; age 22; was admitted March 29, 1864. He had been taken with fever and sore throat on the previous day. He died on the 31st, after a suddenly-developed paroxysm of dyspnœa which lasted thirty minutes. *Post-mortem* examination: Inflammation of the larynx and œdema of the glottis.—*Second Division Hospital, Alexandria, Va.*

Case 9.—Private William H. Schlosser, Co. F, 140th Ind.; age 43; was admitted Feb. 3, 1865, having been affected for a week or two with cough. He had an abundant expectoration and well-marked symptoms of bronchitis. On the 12th his throat became slightly sore, the fauces somewhat reddened, tonsils enlarged and cervical glands swollen. A gargle was prescribed. Two days later he had a little diarrhœa but the throat was better. About noon of the 17th he was suddenly seized with great dyspnœa, his lips becoming quite blue, when, on examination, the uvula, epiglottis and glottis were found to be œdematous. Scarification gave some relief, but an emetic, which was administered, was without effect. At 5 P. M. the patient again became threatened with suffocation, which scarification and inhalation of hot vapor and of acetic acid and ether failed to relieve. Laryngotomy was performed at 7 P. M. by Ass't Surgeon William Norris, U. S. A., the incision passing in the mesial line through the crico-thyroid membrane and cricoid cartilage. After the operation the patient took two or three inspirations, coughed up a few drops of blood, and died. *Post-mortem* examination: The chink of the glottis was completely closed by œdema of the surrounding tissue. [*Specimen* 519, Med. Sec., Army Medical Museum.] The epiglottis was œdematous and much thickened. The trachea and bronchial tubes were inflamed, their mucous membrane thickened and reddened to their minute subdivisions; no false membrane was found in any part of the air-passages. A small patch of pneumonia was discovered in the lower part of the left lung. The other organs were healthy.—*Act. Ass't Surgeon David L. Haight, Douglas Hospital, Washington, D. C.*

Case 10.—Private R. B. Curtis, Co. C, 24th Mich., was admitted Nov. 1, 1862, with laryngitis. He died on the 8th. *Post-mortem* examination: Throat swollen and bloodvessels of neck engorged; larynx inflamed and so swollen from serous effusion in the submucous tissue as to occlude the air-passage. There was no exudation on any part of the respiratory mucous membrane.—*Harewood Hospital, Washington, D. C.*

Case 11.—Recruit Henry F. White died of acute laryngitis Feb. 13, 1864. No history recorded. [*Specimen* 570, Med. Sec., Army Medical Museum, shows the larynx and epiglottis of this case, with the mucous membrane around the orifice of the glottis thickened from œdema.]—*Surgeon John Neill, U. S. V., Hospital Broad and Cherry streets, Philadelphia, Pa.*

Gangrene of the larynx was noted by two medical officers, who have already published their observations.*

VII.—INFLAMMATION OF THE TONSILS.

Inflammation of the tonsils was reported as the cause of 59,911 cases of sickness and 97 deaths among the white troops, equaling an average annual rate of 26.9 cases per thousand of strength, .16 per cent. of the cases ending fatally; and of 6,754 cases and 12 deaths among

* W. H. Studley, Act. Ass't Surgeon—*American Med. Times*, Vol. V, 1862, p. 215—gives the history of a case of disease of the throat which occurred at Fort Hamilton, N. Y., in August, 1862: The patient, a soldier, convalescing from a remittent fever which had developed the characteristics of genuine typhus, became affected with sore throat considered due to exposure to cold and damp air. Fever supervened with considerable debility, and after three days his breathing became laborious and attended with an inspiratory whoop. There was a semitransparent tumor below and anterior to the left tonsil, which was a little swollen; the epiglottis and glottis were very œdematous. Incisions into the tumor and the diseased parts in the vicinity of the larynx gave temporary relief. Death occurred in the night, but whether from exhaustion or suffocation could not be determined from the imperfect account given by the attendant. *Post-mortem* examination revealed no morbid appearances except such as were found in the larynx. The mucous membrane was swollen and of a dark-green color on the right side, the tissues being affected to the depth of one-fourth to one-third of an inch; the morbid condition extended over the ventricle to the epiglottis and by a narrow tract to the left tonsil. Rufus King Brown, Surgeon U. S. Vols., has described —*American Med. Times*, Vol. V, 1862, p. 243—a gangrene of the throat that appeared in the general hospital of the Department of the Gulf in the fall of 1862: The disease involved the root of the tongue, the ventricles and cartilages of the larynx. Its existence during life was not at first known. Out of fourteen cases in which the disease was discovered after death only three presented symptoms that might have directed attention to the seat of the affection; in one there was marked dyspnœa shortly before death and in the others some fetor of the breath. It attacked the sick and debilitated; nearly all affected had been greatly reduced by the miasmatic fever of the Mississippi, and many had suffered long from chronic diarrhœa. Death was sudden and apparently from sheer debility. Evidences of the disease were first observed while making autopsies to find some lesion or morbid state of the internal organs that might account for the fatal result in these cases. The diseased parts had the color of gangrene of pulmonary tissue, although free from the strong fetor of the latter. In a few cases there was œdema of the glottis and serous infiltration in the vicinity of the larynx. The heart was flabby and the blood watery. This condition of the throat was not associated with scurvy.

the colored troops, equaling an average annual rate of 36.8 per thousand and a fatality of .18 per cent. of the cases.

These numbers probably include all the cases of quinsy that came under observation excepting only rare instances of mistaken diagnosis. Thus the 2d Cal. Cav. appears to have suffered at one time from inflammation of the tonsils, which, owing to the violence of the symptoms, and particularly the suffocative feelings experienced by those afflicted, was regarded and reported as an epidemic of complicated laryngitis.* It seems equally probable that the reported cases included most of those in which the tonsils were involved in a catarrhal inflammation of the pharynx, not a few of those in which the inflammation was diphtheritic, and perhaps some in which the tonsillitis was a local manifestation of a constitutional affection. It may be assumed that the percentage of unfavorable results was in part due to diphtheritic inflammation, although the following cases indicate that some at least were fatal from œdema or inflammatory tumefaction of the lining membrane of the larynx:

Case 1.—Sergeant John R. Kurtz, Co. C, 147th Pa., was admitted Oct. 25, 1863, with secondary syphilis. Shortly after admission he contracted scabies, which prevailed to some extent in the ward in which he was placed, but it soon yielded to treatment. On the morning of December 7 his throat was sore and slightly swollen, but there was little or no constitutional disturbance. A stimulating liniment was applied, the throat was wrapped in flannel, and the bowels being costive were moved by Epsom salt. Next day the right tonsil was much enlarged and the pulse a little quickened. Chlorate of potassa was used internally and, with capsicum, as a gargle; stimulants were given, together with such nutritious articles of food as the patient could swallow. On the 9th he felt easy; the right tonsil was discharging freely and the left but little swollen; there was no difficulty in breathing. His condition remained unaltered until midnight of the 11th, when he began to be restless and complained of inability to sleep, for which an anodyne was prescribed. The symptoms did not appear alarming at this time; but in half an hour the patient expired. *Post-mortem* examination: Both tonsils were much enlarged and suppurating freely. The epiglottis and larynx were œdematous. The viscera of the thorax and abdomen appeared healthy.—*Act. Ass't Surgeon* R. M. Girvin, *Satterlee Hospital, Philadelphia, Pa.*

Case 2.—Private H. Nelson Young, 2d Me. Bat'y; age 23; was admitted Oct. 16, 1862, with a slight gunshot wound received at Antietam. On October 29 the right tonsil became inflamed and suppurated. Chlorate of potash was used as a gargle and tincture of iron and guaiacum given internally. On the 31st the patient was so much relieved by the escape of the matter that in the afternoon he was walking about; but at 9 P. M. he was seized with dyspnœa; the veins of the head and neck became turgid and the pulse feeble and too rapid to be counted. On pulling out the tongue by a pair of artery forceps respiration was temporarily relieved: but as it grew more urgent an incision was made through the skin and the crico-thyroid ligament. A little froth issued from the opening, through which the patient breathed freely; his pulse fell immediately to about 96 and his lips appeared almost natural in appearance. Finding respiration thus easy no tube was used. At 11 P. M., the urgent symptoms having reappeared and no tube being at hand, a triangular portion of the cricoid cartilage was removed, but the respirations diminished in frequency and the patient died in half an hour. *Post-mortem* examination: The lungs were filled with serum. The heart was normal. The right tonsil was deeply ulcerated and contained some pus: the left was also ulcerated. The uvula was thickened by effusion of lymph and ulcerated on its right side. The epiglottis was erect, hard and thickened by effusion of lymph beneath the mucous membrane; the aryteno-epiglottidean folds were much thickened, especially on the right side; the chink of the glottis was almost entirely closed by the effusion; several small patches of false membrane were found above the vocal cords, especially on the right side, but there was none below. The mucous membrane of the trachea and bronchial tubes was deeply congested, but without ulceration, effusion or deposit.—*Act. Ass't Surgeon* W. W. Keen, Jr., *Central Hospital, Frederick, Md.*

Case 3.—Colonel J. M.; age 36; of sallow complexion and having the appearance of one broken down by malarial disease, was attacked Dec 13, 1865, with inflammation of the left tonsil, followed by considerable external swelling. He had fever; the pulse was 96, full and hard. Cathartics and antimonials were administered, counter-irritants applied to the throat and vapor of hot water directed to be inhaled. The symptoms were relieved for a time under this treatment: but on the fourth day the patient grew hoarse and suffered from dyspnœa, although the tonsillitis had subsided and the external swelling had almost disappeared. The dyspnœa rapidly increasing, a solution of nitrate of silver containing sixty grains to an ounce of water was applied to the root of the tongue and fauces. This had little effect, and in an hour and a half respiration had become so difficult that suffocation was imminent. Relief was immediately obtained by an incision through the crico-thyroid membrane. A tracheotomy tube was inserted and in a few minutes the patient was able to lie down. Forty-eight hours after the operation respiration could readily be performed through the natural passage. The tube was therefore removed and the wound closed with adhesive plaster.

* See *San. Commission Medical Press*, Vol. IV, 1863, p. 14. According to the report of Charles C. Farley, the surgeon of the regiment, the disease was sudden in its attack and of great severity, being characterized by high fever and great dyspnœa and dysphagia. The latter symptoms were present from the first and soon increased to an alarming degree. In two or three days the disease usually reached a crisis. It affected almost exclusively those who had been exposed to cold at night. No case terminated fatally.

Next day the plaster was changed for a thick coating of collodion. The wound healed in a few days. An erysipelatous rash appeared at the seat of the operation and spread over the right side of the neck, scalp and forehead. It soon disappeared under the application of iodine and the use of internal remedies.

Surgeon WILSON, 13th Ohio, who reported the third case,* considered it one of erysipelatous inflammation which, beginning at the tonsils, invaded the larynx, and finally appeared externally at the wound and spread over the surface.

A few extracts relating to inflammation of the tonsils are submitted along with the records that afford any information in addition to diagnosis and dates of attack and recovery:

Surgeon LOUIS WATSON, *16th Ill., St. Joseph, Mo., Dec.* 31, 1861.—Inflammation of the isthmus faucium, with tonsillitis, prevailed epidemically. The tonsils rarely suppurated.

Surgeon H. W. KENDALL, *50th Ill., St. Joseph, Mo., Dec.* 31, 1861.—The second epidemic, one of tonsillitis, followed closely upon the decline of the measles. Consequently most of the debilitated subjects of rubeola were attacked by the new epidemic. This, with the want of sufficient hospital accommodations, requiring a hasty return of convalescents to quarters, brought many of the men back again and again with relapses and complications which would not otherwise have occurred.

Surgeon J. M. ALLEN, *54th Pa., Sir John's Run, Va., Sept.* 1, 1862.—Malarial fevers and tonsillitis prevailed as epidemics during August. The latter was confined solely to one company; the cause could not be ascertained. This company was almost exempt from fever during the past month. The disease although violent was in no instance fatal. It was accompanied with more or less constitutional disturbance, and invariably yielded to the free use of nitrate of silver. Neither tonsillitis nor diphtheria, to my knowledge, prevailed in the surrounding neighborhood at the time.

Surgeon RUFUS KING BROWN, *U. S. Vols., Ship Island, Miss., February*, 1864.—There were many cases of inflammation of the fauces. The seat of this was circumscribed and not attended with exudation or destruction of any part of the membrane involved.

Act. Ass't Surgeon JOEL SEAVENS, *Fort Warren, Boston, Mass., April* 1, 1863.—Tonsillitis has been quite prevalent, most of those having catarrh or bronchitis having at some time during its course been affected also with an inflammation of the throat. This inflammation has in many cases assumed a diphtheritic aspect, presenting exuded lymph and at times the constitutional symptoms of diphtheria; but it has always yielded readily to appropriate treatment.

CASE 1.—Private Augustus Bevens, Co. B, 20th Me., was admitted Dec. 18, 1862, with incontinence of urine. * * * Jan. 17, 1863: Throat sore; tonsils enlarged. Gave a gargle of capsicum. 18th: Throat better. 21st: Gave ten drops of tincture of iron three times a day in water. 29th: Omitted iron. February 9: Sore throat; great pain in last tooth of left side of lower jaw, which on examination was found overgrown by the gum, preventing the patient from closing his mouth. Gave capsicum gargle. 10th: Tonsils much swollen and painful; dysphagia. Gave a gargle of chlorate of potash. 11th: Less fever and headache; bowels regular. 12th: Throat still swollen; dysphagia. Removed redundancy of gum. 13th: Continued gargle; gave milk diet. 17th: Applied dried alum to gum. March 23: Returned to duty.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 2.—Private Bradbury P. Doe, Co. I, 1st Me. Cav.; age 19; was admitted Dec. 23, 1862, with debility. * * * April 16, 1863: Tonsils very large; deglutition painful. Scarified tonsils. Gave extra diet. 17th: Applied two blisters over tonsils. 18th: Full diet. May 14: Applied tincture of iodine over tonsils. 16th: Tonsils much swollen. 18th: Gave cod-liver oil three times a day. 27th: On guard duty.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 3.—Private Jerome McLain, Co. K, 12th N. J.; age 25; was admitted Dec. 12, 1862, from duty as a member of the hospital guard. He had a mild attack of tonsillitis. A solution of nitrate of silver, ten grains to one ounce of water, was applied to the throat and a dose of Epsom salt administered. 22d: Throat better. Repeat the local application. 23d: Discovered an excavated ulcer on each tonsil, that on the right being particularly large. Throat to be swabbed twice with the caustic solution and a chlorate of potash gargle to be used in addition. 24th: Continued the application to the throat. Ulcers covered with a grayish slough. 26th: Throat decidedly better. Treatment continued. 30th: Patient is sitting up. Continue gargle; disuse nitrate of silver. Jan. 12, 1863: Returned to guard duty.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 4.—Private John D. Sargent, Co. K, 4th N. J.; age 21; was admitted from guard Feb. 19, 1863, with some fever and sore throat. The right tonsil presented an ulcerated patch about the size of a three-cent piece and covered with a grayish pultaceous slough; the left had a smaller but similar ulcer. They were directed to be swabbed morning and evening with a solution of nitrate of silver, fifteen grains to an ounce of water; a chlorate of potash and muriatic acid gargle was also prescribed. The ulcers continued to increase in size until the 22d notwithstanding treatment. After this the general and local symptoms improved, and the record leaves the patient on the 27th doing well and taking full diet with eggs for breakfast and a pint of milk three times a day. [In connection with this case the previous history should be recorded: Admitted Nov. 7, 1862, with two soft chancres, one on the left side of the glans, the other on the frænum. These were cauterized with nitrate of silver. A superficial gland in the left groin became inflamed and was opened December 11. The patient was cured and transferred to the guard for duty on the 30th. No symptoms of constitutional syphilis were manifested.]—*Satterlee Hospital, Philadelphia, Pa.*

* In the *American Journal of the Medical Sciences*, Vol. LII, 1866, page 275.

CASE 5.—Hospital Steward John J. Mahan, 28th Mass., was perfectly well until about 3 A. M. of Jan. 28, 1862, when, having got up to put coal on the fire, he found he had headache, fever and sore throat. He had been for some days back waiting upon a patient suffering from sore throat and submaxillary swelling. At the morning visit his pulse was 96, full; skin warm and moist; throat and uvula very red and inflamed, with purulent appearances upon the tonsils; pain on swallowing; bowels regular. A dose of Epsom salt was administered and blisters applied over the tonsils. 29th: Spent the day yesterday quietly; rested well during the night; the blister rose well; feels better; pulse slightly accelerated and full; throat red and inflamed, particularly the right tonsil, which is coated with a purulent deposit. Treatment continued. 30th: Skin hot and moist; pulse over 80; feels pretty well; throat still red, particularly on right tonsil. An alum gargle was prescribed. 31st: Attended to duty yesterday; rested well during the night and now feels very well, but throat still inflamed.—*Hospital, 28th Mass., Hilton Head, S. C.*

CASE 6.—Private Samuel G. Williams, Co. G, 13th Ill. Cav.; age 45; was admitted April 3, 1864, from Benton Barracks with dysphagia; tonsils swollen and touching each other; uvula elongated and swollen; soft palate inflamed; cervical glands and cellular tissue also swollen; stiffness of jaw; fever; full pulse; headache; anorexia; furred tongue and constipation. Gave a cathartic and applied a solution of nitrate of silver. April 20th: Returned to duty.—*Lawson Hospital, St. Louis, Mo.*

VIII.—DIPHTHERITIC INFLAMMATION OF THE FAUCES, ETC.

PREVALENCE, ETC.—During the first fourteen months of the war no special provision was made on the blank forms of the Report of Sick and Wounded for the numerical record of diphtheritic cases. A form issued in July, 1862, gave diphtheria a place in the miasmatic order of zymotic diseases; but some time elapsed before cases were reported on this form. None appeared during the months of July, August and September; in October 125 cases were reported; in November 217; in December 338, and in January, 1863, 435. This did not signify a rapid increase in the prevalence of diphtheritic disease, but simply that month by month so many medical officers recognized that the new form differed in some respects from the old, and reported as diphtheria cases which had formerly been otherwise returned as, for instance, in the waste-basket of *other diseases* of the miasmatic class.

During the forty-five months, September, 1862, to June, 1866, there were reported among the white troops 7,277 cases, equivalent to an average annual rate of 3.92 per thousand of strength, and 716 deaths, a mortality of 9.84 per cent. of the cases.

Among the colored troops, during the three years of their service, 776 cases and 61 deaths were recorded, a mortality of 7.86 per cent., the average annual rate of cases per thousand of strength being 4.25, or slightly in excess of the rate among the whites. Diphtheria appears to have affected the white men almost as extensively and with a greater fatality than the negroes. Generally the latter suffered more from camp diseases and succumbed to morbific influences more readily than the whites,—cases were in the proportion of 136 among the colored men to 100 among the white men, and deaths as 269 to 100; but diphtheria was so far below this average in its influence on the colored troops that the operation of some saving cause must be assumed, perhaps a racial idiosyncracy, as suggested by some observers.* Lines indicating the monthly rate of prevalence among the white and colored troops may be found on the diagram facing page 738.

It is doubtful if the diphtheria of our camps and hospitals was in every instance, or even generally, a constitutional disease occasioned by a specific poison and manifested by a specific local lesion. In cases 1 and 2, given below, the disease was apparently a sloughing

* In summarizing the mortality statistics of Wilmington, Del., for the year 1882, L. P. BUSH, president of the board of health, comments upon the fact that although thirteen deaths from diphtheria occurred among the white people no fatal case was reported among the colored population. "This still further confirms the opinion of the freedom of the black race from diphtheria. This resistance of that class of people to the cause of this disease has been observed and recorded in the statistics of Wilmington since the disease made its first appearance among us in 1860." The *Medical News*, Vol. XLII, Philadelphia, p. 576, referring to Dr. BUSH's opinion, gives the statistics from some of our Southern cities, by which it is shown that 211 deaths from diphtheria were reported from a population of 331,706 whites and 73 deaths from the disease among 170,022 colored people. If the latter had suffered equally with the white race there should have been 109 deaths instead of 73. These numbers show that in civil life, as in the army during the war, the colored men manifested a relative insusceptibility to the causes of pseudomembranous inflammation of the throat.

pharyngitis, and in case 3 death probably resulted from pneumonia consecutive to a catarrhal inflammation of the fauces.

Case 1.—Private William Campbell, Co. H, 18th Conn.; age 17; was admitted Sept. 6, 1863, with fever and frequent pulse, swollen tonsils and difficulty of breathing. A solution of nitrate of silver was applied locally and chlorate of potash, in ten-grain doses, given every three hours. There was no improvement next day; the tonsils were covered with purulent matter; a thick tenacious expectoration was brought up; respiration was difficult and prostration increasing. An emetic of ipecacuanha and tartar emetic was prescribed, to be followed by quinine, whiskey and beef-tea. On the 8th, after the removal of membranous matter, the tonsils were found to have sloughed considerably. On the 9th the patient was greatly prostrated; he had not slept since his admission; he had much difficulty in swallowing and urgent dyspnœa. He became unconscious at 5 P. M. and died two hours later. *Post-mortem* examination: The tonsils were in a sloughing condition and the fauces much inflamed, but no false membrane was discovered. The lower lobe of the left lung was hepatized and the upper lobe contained tubercular deposits; the right lung was normal.—*Act. Ass't Surgeon J. M. Matlack, Hospital No. 1, Annapolis, Md.*

Case 2.—Private Wilson Weir, Co. K, 4th Me.; age 22; was admitted May 7, 1864, convalescing from typhoid fever. On June 7 while on light duty he was taken with diphtheria, and on the 10th was reported as improving, chlorate of potash, chlorinated soda and solution of nitrate of silver having been used locally and neutral mixture with antimony and spirit of nitre internally. After this the throat was swabbed with tincture of iodine and laudanum, ammonia and olive oil, and gargled with iodine and sulphate of zinc solutions, while whiskey-punch and tincture of iron were employed internally. On the 16th the throat was reported as being too painful to admit of swabbing, and, as the ingesta returned through the nostrils, beef-tea was ordered by the rectum. On the 17th medication by the mouth was resumed, and on the 20th a Seidlitz powder was given in the morning and Dover's powder at night, alum gargle being used as a local astringent. On the 23d tincture of iron was prescribed in doses of fifteen drops three times daily. Next day the patient was much debilitated; he was unable to open his mouth to permit of inspection of the fauces; he drank two pints of milk, and at 6 P. M., having had some milk-punch, he felt better; but death occurred suddenly two hours later. *Post-mortem* examination: Considerable mucus in trachea; sloughing of fauces.—*Mower Hospital, Philadelphia, Pa.*

Case 3.—Private Cyrus G. Chatterton, Co. C, 24th N. Y. Cav.; age 17; was admitted July 24, 1864, scorbutic and much emaciated from long-continued diarrhœa. On August 3 the patient experienced difficulty in opening his mouth and complained of sore throat. The fauces were found inflamed and the tonsils covered with matter. Iron and stimulants were administered, with chlorate of potash as a gargle and counter-irritation externally. On the 5th mucous râles were heard over the chest. An emetic was given but without effect. He died asphyxiated on the 6th. "The constitution of the patient being scorbutic and his condition very low there was not a chance for tracheotomy."—*Fairfax Seminary Hospital, Va.*

But outside of these exceptional instances it is of interest to inquire whether some of the recorded cases of diphtheria were not in reality inflammations of the fauces due to ordinary and non-specific causes, such as exposure to cold and dampness. Some medical officers have alluded to the difficulty of determining with accuracy the true nature of cases that were called diphtheritic.* In the autumn of 1863 diphtheria was reported from certain regiments near Norfolk, Va. The principal sufferers were the 10th and 13th N. H., the latter having had 60 cases and 10 deaths, the former 20 severe cases, one of which was fatal, and about 40 or 50 cases of sore throat, in six of which the tonsils suppurated. Surgeon N. P. Rice, U. S. Vols., who investigated these cases Sept. 8, 1863, regarded them as specific inflammations of the throat in men broken down by excessive fatigue, a deficient dietary and previous sickness.

From careful inquiries in these and all the other regiments of the division I should say that there was some doubt whether the disease was idiopathic diphtheritis. Enough material could not be shown to define this with a sufficient degree of positiveness. I saw but one patient, a man in the 4th R. I., who exhibited any serious trouble in the throat. There was here a distinct membrane on a raw bleeding surface, but as the throat had just been freely cauterized with nitrate of silver and the man was using tincture of iron, the particular character of the exudation was much obscured. In a Connecticut regiment three cases were observed which showed great congestion and tumefaction of the tonsils, with small patches of pus immediately beneath the mucous membrane. It was stated by one of the medical officers that he had seen the exudation covering the fauces, the roof of the mouth and the nasal passages. The description of the disease, with the manner of death, answers as well for a great depression of the vital powers due to exhaustion from the inflammatory action of the throat and the inability to take food as for a true diphtheria. It is the universal testimony of all the medical and regimental officers that the disease appeared shortly after the

* Thus, A. C. Hamlin, Ass't Surgeon 2d Me., remarking on the blended and masked character of disease as often observed in our armies, alludes to diphtheria as having phases and complications that render its recognition by no means easy.—See *American Med. Times*, Vol. IV, 1862, p. 107. The cases which he saw were those reported by Surgeon S. B. Morrison, 2d Me.—See *infra*, page 738.

return of the regiments from the expedition up the Peninsula, where the men suffered greatly from fatigue and exhaustion. On their return they reoccupied their old quarters, which had been left standing. They went into camp afterward in a heavy cold rain upon ground which is naturally of a cold character, with the subsoil water but a few feet below the surface. The cases occurred in men of a depraved and broken-down constitution, and especially in those who had suffered from fatigue on the Peninsula or who had been affected with sickness or sunstroke. A peculiar fact, discovered in all the regiments, was the existence in many of the men of indolent ulcerations of greater or less size, occurring singly, in patches or diffused on the legs and ankles. They are said to have commenced as slight pustules with no purpuric blotches; they are difficult to treat, stimulation seeming to increase their size. These cases average 20 to 40 to a regiment. Other scorbutic symptoms do not show themselves. The ulcerations first appeared on the return from the expedition, about the same time as the alleged diphtheritic trouble. Most of the medical officers asserted that the two manifestations of disease never existed in the same person. Nothing could be discovered in the neighborhood to account for these ulcerations, nor was there anything peculiar in the living or habits of the men except the slight general use made of vegetables and the occurrence of the disease upon their return from the Peninsular expedition, during which it is probable that they were almost wholly deprived of antiscorbutic diet. The ulcerations have, indeed, the appearance and character of those seen during the severe scorbutic attack among the troops of the Army of the Potomac at Harrison's Landing in July, 1862. The trouble in the throat may have been of the same character, exhibiting itself in this more acute inflammatory manner because occurring in persons of broken-down constitutions at a time when the vital force was much lowered by previous fatigue and privation. The immediate cause was probably the cold and dampness of their camp-sites. The disease is subsiding in both the regiments because they have gone into dryer and more open camping-grounds,—because they are rested and in better physical condition, and because the use of vegetables is now more general. The ulcerations have ceased to break out afresh and in most cases are improving. The discrepancy in the number of cases reported by the two regiments I consider due to the different character of ground upon which each was camped at the time the disease appeared, the 13th being on a damp, cold, thickly shaded site, the 10th close by but on more open ground. The different physical characteristics of the men of the two regiments may have also had an influence, the one least affected being of much better material than the other.

Act. Ass't Surgeon JOEL SEAVENS reported that many of his cases of inflammation of the throat assumed a diphtheritic aspect,* and a similar phraseology is occasionally encountered in some of the recorded cases.

CASE 4.—T. T. Royal, prisoner of war; age 14; was admitted May 9, 1864, with inflammation of the tonsils. A chlorate of potash gargle was used and tincture of iron given every three hours. After a time the throat assumed a diphtheritic appearance, when cauterization was employed and stimulants administered. He died on the 25th. *Post-mortem* examination: The diphtheritic exudation extended as far as the glottis, which was ulcerated; the trachea was full of pus. The pericardium contained a quantity of serum.—*Third Division Hospital, Alexandria, Va.*

CASE 5.—Private Eli C. Mattson, Co. H, 9th N. Y. Cav.; age 22; was admitted from Augur hospital, Alexandria, Va., Feb. 11, 1865, suffering from acute pharyngitis and tonsillitis, with exudation and sthenic pyrexia. The disease at first appeared to yield partially to treatment, but later it devoloped a distinct diphtheritic character; the local affection increased in severity, the false membrane appearing on the walls of the pharynx and gradually extending. About a week after admission the patient's stomach became irritable, and for the last two days before death nothing was retained except a little water from ice melting in the mouth. The fever continued sthenic in character until two days before death, when the system began to suffer from imperfect æration of the blood. From that time the purple hue of the skin became increasingly marked. Latterly very little urine was voided, but no uræmic effects were observable, the mind being perfectly clear until death, which occurred on the 24th. The case was treated at first with saline laxatives and Dover's powder, with tincture of iron internally in doses of fifteen drops repeated every four hours,—applied locally by sponge and used diluted as a gargle. Nitrate of silver and alum solutions were also employed as topical applications. Afterwards lime-water was given with milk; sinapisms and a blister were applied to the epigastrium and nutrient enemata administered. *Post-mortem* examination: The tonsils and larynx were much inflamed; the trachea lined throughout with a firm false membrane, which, on the left side, extended into the ramifications of the bronchus; the bronchial tubes of the right lung were greatly inflamed but not lined with membrane; the lungs were healthy. The heart contained a firm washed clot in each ventricle, the right clot being larger and more firmly attached than the other. The stomach, liver, spleen and intestines were normal. [*Specimen* 515, Med. Sec., Army Medical Museum, from this case, shows the epiglottis much thickened and the larynx lined by a thick pseudomembrane which extends to the tonsils and over the sides of the tongue.]—*Ass't Surgeon Harrison Allen, U. S. A., Mount Pleasant Hospital, Washington, D. C.*

Sometimes, after the tonsils became injected and swollen, many days elapsed before the diphtheritic character of the inflammation was evident. In cases 6 and 7 an ordinary or non-specific inflammation was present for ten days before the diphtheritic appearances were observed; and in the latter case the attack was apparently the result of exposure to cold while the individual lay asleep on the hospital grounds.

CASE 6.—Private James Vanderworker, Co. E, 46th N. Y.; age 19; was admitted Oct. 5, 1864, with a gunshot wound of the fingers. On the 12th he was attacked with tonsillitis and on the 22d diphtheria was developed. He died on the 26th. *Post-mortem* examination: A false membrane lined the larynx, trachea and bronchial tubes, forming on the left side a complete cast of the whole of the air-passages to the minutest ramifications, but not extending into the air-vesicles. The right lung was not involved. A small portion of the membrane had been detached from the surface of the larynx and hung loosely in the cavity. Large portions of it were also detached from the trachea and lost. In the left bronchus was found a perfect tube. When the false membrane had been detached the mucous membrane was found to be highly congested and to have lost the more superficial parts of its epithelium. [*Specimen* 411, Med. Sec., Army Medical Museum, shows the left bronchial tube and its principal ramifications occupied by a tubular cast of pseudomembrane.]—*Ass't Surgeon C. A. McCall, U. S. A., Mount Pleasant Hospital, Washington, D. C.*

CASE 7.—Private Charles A. Greenman, Co. C, 32d N. Y., was admitted Sept. 2, 1861, with typhoid fever. During convalescence he took cold, on the 20th, while sleeping in the hospital garden, his throat at once swelling and becoming sore. On October 1 a diphtheritic membrane was observed in the upper part of the pharynx, but there was little constitutional disturbance. A solution of nitrate of silver, forty grains to an ounce of water, was used locally, with chlorate of potash and tincture of iron for internal use. On the 4th the membrane appeared in irregular patches about the palate and tonsils, interfering but little with swallowing, although the parts were very tender; the patient was anæmic. On the 5th a fly-blister was applied to each side of the neck. On the 15th the false membranes were disappearing.—*Hospital, Alexandria, Va.*

Exposure to cold and dampness, especially at night, was frequently regarded as the cause of diphtheritic attacks as well as of the quinsies and *sore throats* that were invariably associated with them in a command. When diphtheria prevailed tonsillitis was common, and the latter was generally referred to the milder operation of the epidemic cause.

Surgeon S. B. MORRISON, *2d Me., Hall's Hill, Va., Oct.* 31, 1861.—There have been many cases of sore throat in this regiment during the last two months. Most of them appeared immediately after a storm, especially among those who had been on guard at night or on picket duty and exposed to the combined influence of cold and moisture, though some occurred without any such exposure. At first there would be a slight difficulty of swallowing, with a general tumidity and redness of the fauces. Soon the uvula became elongated and enlarged and the tonsils highly inflamed, with aphthous patches upon them the size of half a dime. These patches often spread so rapidly that, in the course of twenty-four hours from their first appearance, they would cover both tonsils and nearly the whole intervening space, and the surrounding parts would be so much swollen as to cause great difficulty in swallowing. Soon afterwards the membrane became detached, either wholly or partly, leaving the parts underneath of a deep-red or almost purple color. The cervical glands were liable to swell and the neck in front to become full and œdematous, though this did not usually occur until the disease had lasted two or three days. Typhoid symptoms appeared only in severe or prolonged cases. There have been in the regiment eight cases which I have no hesitation in pronouncing genuine diphtheria and a large number showing premonitory indications of this disease, which have been speedily subdued by local applications of nitrate of silver, tannic acid, chlorate of potassa and persulphate of iron. The same local applications have been made in more advanced stages of the disease, and tonics and stimulants have been given freely when typhoid symptoms called for them. No fatal case has occurred in camp, though one patient died at the general hospital a day or two after being sent there. In that case there was severe epistaxis and a large abscess in the fauces; neither of these symptoms was present in any other case.

Surgeon B. B. BRASHEAR, *16th Ohio, Cumberland Ford, Ky., April* 10, 1862.—Diphtheria made its appearance among the sick in quarters as well as among those in hospital, but only to a limited extent. It attacked some of the convalescents from continued fever, two of whom died. There was a great deal of sore throat, which was no doubt referable to the diphtheritic influence and which might have been called diphtheria; but no case was so recorded unless the characteristic membrane was observed. Fifty per cent. of the cases of this kind terminated fatally.

Surgeon T. HILDRETH, *3d Me., White's Ford, Md., November*, 1861.—Inflammation of the throat prevailed, and we had eight cases of well-marked diphtheria, one of which proved fatal. All of these cases occurred in company G, although there was nothing in its location to account for the disease prevailing in it more than in the other companies. The treatment in nearly all the cases was tonic and sustaining; there was great depression of the vital powers, the patient in the fatal case apparently dying from exhaustion. Local applications to the throat were used freely, but with little or no apparent advantage. The causes of this disease appeared to be exposure during cold damp weather. The tents at this time were old and leaked badly, and the diminution of all inflammatory affections of the throat after the men got into new and comfortable tents was very apparent.

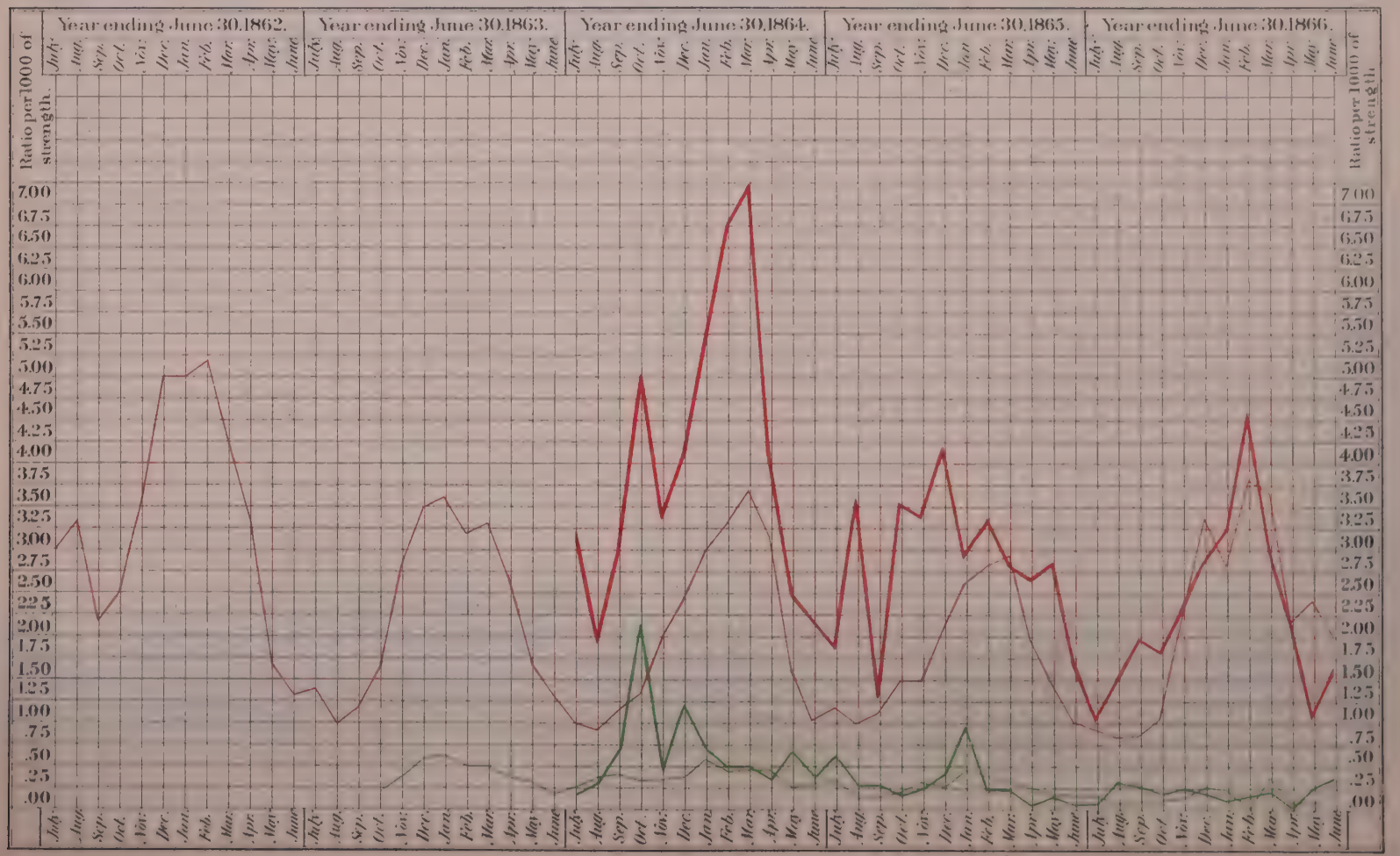
But the statistics fail to show that coincidence between the prevalence of tonsillitis and diphtheria which should be observed had the former been, even in part, a mild expression of the epidemicity of the more dangerous disease. Tonsillitis appeared among the white troops in waves of prevalence distributed over the winter and spring months, December to March, inclusive. These are illustrated in the diagram facing this page. Had diphtheria been connected with their causation the line indicating its prevalence would probably have

Diagram illustrating the Monthly Prevalence of Tonsillitis and Diphtheria among the White and the Colored Troops.

Tonsillitis, *Diphtheria,* *among White Troops.*

Tonsillitis, *Diphtheria,* *among Colored Troops.*

(Cases of Diphtheria were not reported under a specified title during the early period of the war.)



given some evidence of the connection. But no such distinct seasonal influence is exhibited by the record of diphtheria. Slight elevations may be observed in the rate for some of the cold months, but these rarely coincide with the greatest prevalence of tonsillitis. In fact the increased prevalence of diphtheria does not appear to have exercised any effect in elevating the line of tonsillitis. It may be said that the waves of prevalence of the non-specific inflammation of the throat were too high to be materially affected by those due to a diphtheritic tendency. This may be granted; but when the periods of infrequency of tonsillitis, for instance the month of August of each year, are found to coincide with high rates as well as with low rates for diphtheria, the latter disease cannot have exerted much influence on the prevalence of the former. In August, 1863, when the diphtheria-rate was high, only 2.4 cases of tonsillitis occurred for each reported case of diphtheria, while in August, 1865, when the diphtheria-rate was low, the ratio was 15.9 to 1. The same want of relation is observed in the statistics of the colored troops, if the month of October, 1863, be excluded. During that month both diseases were of frequent occurrence; but as no other analogous coincidence appears this must be regarded as accidental.

There is another method of viewing the association of diphtheria and tonsillitis which is not inconsistent with a want of relation between their lines of prevalence. The records already submitted indicate that ordinary influences, such as exposure to cold while sleeping on the ground or in the open air, produced a disease which was as much a true diphtheria as if it had been propagated by specific infection. It had the same local lesions which from peculiarity of site were prone to occasion sudden death, and was attended with the same constitutional disturbances and general prostration. Practically it was the same disease as that which is usually considered a specific diphtheria. If the cases hereafter presented be examined, most of the patients will be found to have been in a low condition from the effects of some antecedent disease or injury. Thus many were suffering or convalescing from typhoid fever, some from malarial fever, pneumonia or diarrhœa. These were cases that occurred in the general hospitals, the inmates of which had usually a history of previous sickness. Taken alone they would therefore have no weight in the argument; but when it is remembered that in the field the men attacked were those that had just been exposed to the depressing yet actively injurious influences of guard and picket duty at night, or, as in the experience of Surgeon BRASHEAR, the sick in quarters and the convalescents from fever in the regimental hospital, a condition of lowered vitality may be readily allowed as one predisposing to the diphtheritic attack. But it is not found that tonsillitis selected its subjects from among the convalescents. Whence it may be inferred that while the frequent and sometimes inevitable exposures of military life induced tonsillitis or catharrhal pharyngitis in the robust and healthy, their effect on the weakly or prostrated was a pseudo-membranous inflammation; and that in our camps the conversion of the milder into the more dangerous disease, by the presence of unwholesome conditions in the system of the individual, was the true explanation of the association of sore throat with epidemics of diphtheria, although that usually accepted regarded the diphtheria as the primary disease and the milder cases as an extended expression of its endemicity. This explanation does not involve a tendency to parallelism in the prevalence of the two diseases. Exposure to cold and dampness produced tonsillitis; hence the prominences in the line expressing its prevalence during the winter and spring months,—but something more was required for the production of diphtheria, apparently a broken down condition of the system. During the war

the winter was for a large part of the army a season of rest, recuperation and ample supplies, which would obviously have tended to counteract a disposition to pseudomembranous inflammation. The somewhat greater prevalence of diphtheria among the Confederate prisoners, 5.6 cases annually per thousand of strength, as compared with 3.9 cases among our white troops, is of interest in view of the generally deteriorated condition of those men. This view finds material support in the fact that the fever of diphtheria is a symptomatic fever which keeps pace with the local inflammation and subsides on its cessation.*

Moreover, the inflammation of the fauces associated with and dependent on the specific poisons of the eruptive fevers sometimes assumed a diphtheritic character. In erysipelas of the head and face there was at the outset an inflammation of the mouth and throat in so many instances that its dependence on the erysipelatous poison is strongly suggested.† In some it was merely erythematous, but in others the tissues became largely infiltrated; sloughs were occasionally cast off and at times a pseudomembrane was developed. These diphtheritic cases can be separated from their erysipelatous connections and attributed to a specific diphtheritic poison only by faith in a doctrine and not by the authorization of facts.

The records of diphtheritic dysentery must not be forgotten in this connection. In the majority of these there was nothing to suggest a specific infectious disease with its primary disorder of the blood and its subsequent local lesions.‡ On the contrary, the disease was generally not only a local but a simple inflammatory affection at the outset. Diphtheritic dysentery began with a simple inflammatory stage either developed independently or supervening on an acute diarrhœa. In other instances it appeared in the progress of a chronic flux, when the vitality of the patient had been much reduced, and, indeed, it was a common mode of fatal termination in disorders of that class. Only occasionally was its attack so abrupt and intense as to countenance the assumption of HEUBNER that it may occur without any preliminary catarrhal stage. An acute diarrhœa or dysentery lasted days or weeks before it assumed the diphtheritic character. The prevalence of diphtheritic inflammation can only be approximated. It was present in 12.7 per cent. of 905 *post-mortem* observations in cases of diarrhœa and dysentery. Applying this rate to the total number of deaths from these diseases, no less than 4,800 deaths among white troops must be attributed to diphtheritic inflammation of the intestinal lining, although only 716 deaths are reported as due to the same pathological process affecting the mucous membrane of the throat.§

Either there was no specific diphtheria in our camps or the specific cause was subordi-

* In the latest authoritative publication on the subject of diphtheria GERHARDT of Wurtzburg is reported as speaking of the fever in the following terms:—"Diphtheria may be said to be always accompanied by fever, or at least those cases in which no fever is present are exceedingly rare. This fever differs in many respects from that accompanying other infectious diseases. Thus we find that in many infectious diseases, as in variola, measles, etc., the original fever is caused by a peculiar process of infection which takes place in the blood and which is the characteristic of these diseases; and that, on the contrary, certain periods of fever which supervene later on, as for instance the fever of suppuration, the fever of decrustation in variola, those forms of high fever occurring in parotitis when the testicles become implicated, are independent of the original fever. It is very different with diphtheria. Here the fever is directly dependent upon the local affection, and the rule may as well be stated here, that as long as the local affection keeps on increasing the fever will also increase, and that so soon as this ceases the fever will also cease."—Dr. BEYER's translation of HEUBNER's Prize Essay—*Experimental Diphtheria*, Detroit, 1885, p. 59.

† See *supra*, page 665.

‡ See Part II of this work, page 350.

§ The transmission of diphtheritic inflammation from the throat to the intestine and *vice versa* is suggested by an editorial in the *Medical Times*, Philadelphia, Pa., Vol. XII, 1881-82, p. 267. In referring to the experimental researches of Drs. Wesch and Formad on pseudomembranous [illegible] diphtheria [illegible] at Lakeview, Mich., the following statements are made: "A very important and curious observation was made by Dr. Formad at the post-mortem examinations. The pigs of a family living in an isolated position in the forest were fed with slops from a room where three of the children were sick with the disease. Several of the pigs sickened and one died. At the autopsy, made by Dr. FORMAD, the larynx and respiratory passages were found [illegible] diseased, whilst the lower end of the œsophagus, the stomach and the upper duodenum were coated with a very thick false membrane loaded with micrococci and containing the other anatomical elements of true diphtheritic membrane. Underneath this false membrane the mucous membrane was inflamed and in numerous places ulcerated. In the blood of the pig, as well as in the spleen and the bone-marrow, the micrococci were exceedingly numerous. They were seen attacking the leucocytes and another particularity concerning [illegible] the action of the plant in malignant human diphtheria. Inoculation of rabbits with the membrane from the stomach of the pig produced sickness and death, with symptoms and local and general lesions similar to those caused by the human membrane. This observation is very important as showing the local nature of diphtheria in its first onset, and especially as raising the suspicion that the swine-plague of the West has close relations with human diphtheria."

nate to and obscured by other influences. The reported cases derived their origin from the ordinary causes of inflammation of the tissues in individuals predisposed to pseudomembranous developments, or they were the product of a specific cause which was controlled by the vitality of the individual exposed to its influence. On the latter supposition, with the system in a normal or healthy state, the specific germ, poison, agency or influence had no more power than an ordinary irritant and its results were local,—a subsiding or suppurative tonsilitis or a catarrhal pharyngitis controlled by the vitality of the sufferer: but with the system in a condition of depression the inflammatory products passed beyond the control of the vitality of the individual and were given up to putrefactive agencies by which the system became exposed to septic infection.

Since Oertel called attention to the presence of micrococci in diphtheritic pseudo-membrane* many observers have urged the germ theory of this disease: but this theory has not been established, and indeed the latest observations do not subvert the conclusion reached by Dr. Wyman† in his investigation of this subject in connection with diphtheritic dysentery,—that the micrococci naturally present in the locality found favorable conditions for their development in the diseased tissues, and that their multiplication is not a cause but a result of the diseased action.†

In the healthy buccal cavity are many species of micro-organisms which vary in different individuals, and in the same individual at different times, as well in shape as in mode of action. These bacteria have a septic influence when introduced into the circulation of certain animals, as the rabbit, but so far as the ordinary state of the human organization is concerned they have no pathological significance. When, however, the vitality of a tissue ceases, its organic elements are given up to the fermentative or putrefactive action of just such micro-organisms as are found at all times in the mouth. When vitality is impaired, as in the presence of a diphtheritic inflammation, it may reasonably be assumed that the diseased tissues afford a more congenial nidus for bacterial development than the healthy epithelial surface. The micrococci are therefore to be regarded, in the absence of affirmative testimony to the contrary, rather as a result than a cause of the disease. The manifest inefficiency of all attempts to disinfect the throat, and the aggravation of the disease which follows such attempts when of an irritant character, seem also to indicate that the inflammation is not due to the micrococci, which must therefore be considered as accidental. But although unconnected with the causation of the primary inflammation, they may be plausibly regarded as productive of septic results in the individual by absorption of the necrotic products associated with their growth and multiplication, and if these products be considered possessed of infectious qualities the pathology of the disease is complete until a stronger light is thrown on this subject by the progress of investigation.

Drs. Wood and Formad of Philadelphia have presented results of much interest.‡ According to these observers the micrococci of diphtheria do not differ from those ordinarily found in the mouth except in their tendency to grow in culture-fluids. The rapidity of growth of the micrococci is in direct proportion to the malignancy of the diphtheritic case which furnished them. Every grade of case may be found in men, from an ordinary sore throat,

* [illegible]

† [illegible]

‡ [illegible]

through simple pseudomembranous angina and tracheitis up to malignant diphtheria. The micrococci, although primarily accidental, become, by growth under favorable conditions, invested with specific properties. The theory of the disease, deduced from these observations, is that certain circumstances outside of the human body are capable of throwing this common micrococcus into its condition of active growth and engendering an epidemic of diphtheria. Later observations by the same authors lead to the conclusion that the septic and diphtheritic micrococci are specifically one, and that diphtheria is a septic sore throat, or "is simply what it was called a century ago, *putrid sore throat with or without a secondary constitutional septicæmia*."*

Experience of diphtheria in civil life indicates the existence of an infectious quality connected probably with the products of bacterial growth in necrosed tissues, or, according to the views of WOOD and FORMAD, with the increased vital activities of an ordinary septic micrococcus. The disease may thus be propagated in favorable circumstances independent of the constitutional state; but there is little evidence of its spread in this way during the war. Surgeon THAYER speaks of its prevalence in his regimental hospital; the statement in the case of Sergeant George W. Hough, that the patient was taken with the ward sore throat, indicates a local prevalence in one of the wards of the Satterlee hospital, Philadelphia; and Brigade Surgeon MCRUER reported some cases that were suggestive of contagion.

Surgeon WM. H. THAYER, *14th N. H., Carrollton, La., May* 4, 1864.—Diphtheria was first seen in June, 1863, and the regimental hospital was not without it afterwards for six months; but it did not extend in the hospital to any other patients until November, when three inmates were suddenly attacked. All other patients except those with diphtheria were at once removed to general hospital and there was no further extension.

Serg't George W. Hough, Co. E, 14th Mich.; age 20; was admitted Dec. 12, 1862. This patient had been sent to hospital at Washington, D. C., September, 1862, on account of great debility, the result of constant exposure and frequent attacks of rheumatism. He has at present a slight cough with pain in the left breast and rheumatic pains in the ankle-joints and the muscles of his legs and lumbar region; he sleeps well, has a good appetite, and for the last two weeks has had no diarrhœa. He has been taking cod-liver oil and liquorice mixture. On December 28 the cod-liver oil was omitted and wine of colchicum substituted. At this time he was taken with "ward" sore throat, for which an alum gargle was used. On Jan. 7, 1863, acetate of potassa was added to the colchicum, and a drachm of iodine tincture in an ounce of camphorated oil was used as an external application. He was discharged February 14.—*Satterlee Hospital, Philadelphia, Pa.*

Surgeon D. MCRUER, *Sedgwick's Brigade, Army of the Potomac, December*, 1861.—During the last two months diphtheria has prevailed in the 3d and 4th Me., and from the manner of its introduction as well as its mode of progress through the camps it might be inferred to be contagious. It was first observed in the families of three civilians who lived in the vicinity of the 4th Me.: five children died of the disease. The soldiers of the 4th, who had free intercourse with these families, were first attacked; fourteen cases occurred, three fatal. The troops of the 3d, having free communication with the 4th, were next seized; seven cases, two fatal. The other regiments, the 38th and 40th N. Y., have not suffered, although only separated from the Me. regiments by a public highway; and as this immunity might be attributed to the fact that the N. Y. and Me. troops have but little intimacy it affords another point of suspicion in favor of contagion.

CLINICAL RECORDS.—The general character of the clinical records of diphtheria may be gathered from the following examples: 8–17 from the records of the hospitals at Alexandria, Va.; 18 and 19 from the Satterlee and 20–22 from the Mower hospitals of Philadelphia, Pa., and 23 from the Field hospital of the Fifth Army Corps.

CASE 8.—Private L. W. Doloff, Co. I, 5th Me., was admitted Sept. 2, 1861, with typhoid fever. He was convalescent when, on October 25, he was taken with sore throat; pulse 88; skin hot; slight exudation with swelling of left tonsil; no external swelling. Applied nitrate of silver solution, ten grains to an ounce of water, morning and evening; prescribed tincture of iron in water as a gargle and five grains of chlorate of potash every four hours for internal use. On the 27th the pulse was 78; skin cool; bowels constipated, and the exudation spreading over the tonsils. By November 2 the exudation had disappeared. The patient was returned to duty December 14. He occupied a bed in a large, well-lighted and ventilated ward. His was the third case of diphtheria in this ward.

CASE 9.—Private Jacob Cunningham, Co. A, 4th Me., was admitted Sept. 1, 1861, with typhoid fever, from which he recovered. On November 3 his skin became hot and dry; pulse 90 and full; tonsils much swollen and covered

* *Memoir on the Nature of Diphtheria, Annual Report of the National Board of Health*, 1882, page 133.

with exudation. A solution of nitrate of silver was applied; tincture of iron, diluted, was used as a gargle and five grains of chlorate of potash given every three hours. 4th: Pulse 90; skin hot; swelling stationary; exudation diminished. 5th: Pulse 80; skin cool; bowels open; swelling diminished; but little exudation and confined to the left tonsil. 6th: Sitting up all day; appetite good. 13th: Returned to duty.

Case 10.—Private Lyman Howard, 16th N. Y.; admitted Sept. 3, 1861, with typhoid fever. He convalesced, but on November 6 had a slight inflammation of the tonsils and soft palate. Alum was used as a gargle and a sinapism was applied. 7th. Slight deposits of white exudation on the inflamed parts. Applied solid nitrate of silver: gave twenty drops of tincture of iron, one drachm of a saturated solution of chlorate of potash and one grain of sulphate of quinia three times daily. 8th: White exudation covering inflamed surface of left tonsil, edge of soft palate and left side of uvula. Reapplied nitrate of silver; repeated sinapism; used tincture of iron and solution of chlorate of potash as a gargle. 9th: Exudation stationary; pulse 90; bowels regular. Repeated nitrate of silver; towards evening exudation became detached. 11th: Patient improving. Applied a solution of ten grains of nitrate of silver in one ounce of water. 12th: Exudation thinner and less extensive. 24th: Returned to duty.

Case 11.—Corporal Charles Wickwire, Co. G, 16th N. Y.; age 21; was admitted Sept. 22, 1861, with intermittent fever, for which Fowler's solution was administered. On October 6 he was returned to duty, but was readmitted on the 14th with a recurrence of the disease. On the afternoon of the 24th he had fever not preceded by a rigor: pulse 90; skin hot; throat sore and right tonsil covered with an exudation. On the evening of the following day the left tonsil also became coated. The throat was swabbed with a solution of nitrate of silver; tincture of iron, diluted, was used as a gargle, and five grains of chlorate of potash were given every four hours; castor oil was employed to move the bowels. The exudation did not entirely disappear until November 5. Sugar was found in the patient's urine some time afterwards. He was placed on duty as nurse on the 21st. This was the first case of diphtheria which occurred in the Fairfax street ward,—one of the best wards of the hospital. Proper precautions were taken to prevent contact with the other patients.

Case 12.—Private Moses Packard, Co. K, 5th Me., while convalescing from typhoid fever was taken, Oct. 24, 1861, with sore throat; pulse 95; skin hot; tonsils much swollen; exudation on right tonsil. Used nitrate of silver solution and iron gargle; chlorate of potash internally. 25th: Pulse 90; skin hot; bowels costive; tonsils swollen; exudation extending towards the right; submaxillary glands swollen. Gave an ounce of castor oil. 26th: Pulse 90: skin hot; swelling and exudation unchanged; bowels moved. 27th: Pulse 85; skin hot; exudation extended to the left tonsil; bowels open. 29th: Pulse 70; skin cool; swelling much diminished and exudation lessened. November 5: Steadily improving; but little swelling; slight exudation on left tonsil. 13th: Returned to duty.

Case 13.—John Adams, Co. G, 40th N. Y.; age 25; was admitted Nov. 8, 1861, having suffered for two weeks with headache, much lassitude and pain in the back and bones. His pulse was 90 and full, skin hot, tongue dry and brown in the centre, right iliac region tender but the bowels quiet. He became delirious on the 10th and for some days had more or less diarrhœa. On the 18th he felt chilly and afterwards feverish; his throat became sore in the evening, and next day a patch of exudation about the size of a three-cent piece was found on the left tonsil. This extended rapidly, covering the fauces and interfering with respiration. He died on the 22d.

Case 14.—Private J. W. Johnson, Co. B, 32d Pa., was admitted Nov. 9, 1861, with typhoid fever. He improved, and on the 16th all medicine was stopped except turpentine emulsion, and he was placed on milk diet. On the 20th oyster soup was permitted. On the 24th he became feverish, had pain in the throat and an exudation on the left tonsil, which continued to extend until the 26th, and thereafter gradually disappeared. Nitrate of silver, tincture of iron, chlorate of potash and whiskey-punch were used in the treatment. He was returned to duty Jan. 22, 1862.

Case 15.—Private Lewis Lamon, Co. D, 32d Pa., was admitted Nov. 14, 1861, having been sick for two weeks with chills and fever, which had assumed latterly a typhoid type. His tongue was dry and fissured and he had great abdominal tenderness, diarrhœa and much cough. Delirium supervened on the 19th; sordes appeared on the teeth on the 20th and there was meteorism with much epigastric tenderness. Diphtheritic exudation was found in the throat on the 21st, when the breathing became labored and the feet and hands purple. He died at noon of the 22d.

Case 16.—Recruit James McGowan, 30th Me.; age 26; was admitted Jan. 5, 1865, from Washington street prison, Alexandria, Va., with pneumonia. He convalesced; but suddenly the tongue and sublingual glands became much swollen and the tonsils and pharynx covered with an ashy-white membrane easily removed by means of nitrate of silver; it came away in flakes half an inch square, but it formed anew very rapidly. Chlorinated soda solution was used as a gargle and stimulants, tonics and nutrients were administered. The patient died on the 28th.

Case 17.—Private Adam Huff, 14th N. J.; age 24; was admitted March 22, 1864, with diphtheria: Tonsils enlarged: speech indistinct; skin hot and dry; pulse frequent; severe pain in the head and upper part of chest. Used a saturated solution of chlorate of potash in hot water as a gargle; Dover's powder. 23d: Pulse 100, hard; skin hot and dry; tonsils much swollen, covered thickly with exudation; breath very offensive. Gave twenty drops of tincture of iron every three hours. 24th: Pulse 80, full. April 26: Returned to duty.

Case 18.—Corporal John O. Tuell, Co. F, 6th Me., was admitted Aug. 10, 1862, with chronic diarrhœa, hypertrophy of the heart and general debility. In a few weeks he was able to move about the ward with other convalescents. On the morning of October 10 he was found in bed suffering from severe headache, with furred tongue, quick pulse and hot skin. In the afternoon he took three compound cathartic pills, which moved his bowels freely and to some extent checked the fever. In the evening he complained of sore throat, and next day the fauces and part of the tongue were covered with a diphtheritic membrane. The throat was touched four times a day with hydrochloric acid and water, the internal treatment consisting of twenty drops of muriated tincture of iron every three hours.

On the 12th the patient seemed somewhat better, his skin moist and pulse less frequent. In the afternoon chlorate of potash was prescribed along with the iron in doses of ten grains every three hours. On the 13th the fever and swelling had somewhat diminished and deglutition was less difficult. Treatment was continued, and on the 17th the throat was nearly free from diphtheritic deposits and the patient recovering rapidly. He had during the attack as much beef-tea and other nutritious articles as he could take.

CASE 19.—Private Timothy Donovan, 1st N. Y. Cav.; age 33: was seized with sore throat Oct. 8, 1862. At this time he had just begun to recover from a severe attack of jaundice, with obstinate constipation and fainting fits. He had thus been for some time in feeble health. The sore throat was accompanied with extreme prostration, dysphagia and severe pain in the ear and right side of the face; his pulse was upwards of 100 and feeble. On the right side of the fauces and posterior wall of the pharynx were thin grayish-white exudations; the voice was somewhat husky; there was slight cough, and sometimes, in swallowing, fluids returned through the nose. Tincture of chloride of iron was given every fourth hour, and a strong solution of sulphate of copper was applied on and around the exudation every four or five hours. The membranes did not spread after this and by the 19th they had disappeared. By November 1 the patient was well, though still very weak.

CASE 20.—Private James M. Greer, Co. D, 5th Mich, Cav.: age 35: was admitted May 6, 1864, as a convalescent from typhoid fever. He was weak and much emaciated. Iron, quinine and extra diet were prescribed. 17th: Sore throat: diphtheritic patches on fauces. Gave tincture of muriate of iron and chlorate of potash. 18th: Very weak. 19th: Dark-colored offensive stools. Gave beef-tea and milk-punch every hour. 20th: Beef-tea and punch every half hour: five grains of carbonate of ammonia every two hours. Failing rapidly. 21st: Died at 1 A. M.

CASE 21.—Private Truman B. Richardson, Co. E, 2d N. Y. Cav.; age 19: was admitted from City Point, Va., July 16, 1864, much prostrated by severe diarrhœal attacks. 22d: Inflammation of throat. Gave astringent gargle; applied tincture of iodine. 24th: Throat and fauces much worse; no diarrhœa. Used nitrate of silver solution: gave tonics. 26th: Uvula, tonsils and palatine arch covered with diphtheritic membranes. Cauterized with strong solution of nitrate of silver; applied saturated solution of chlorate of potash and tincture of iron to throat every half hour. 28th: Profuse expectoration: throat gangrenous. Cauterized every six hours with eighty grains of nitrate of silver in one ounce of water; gave a gargle of alum and chlorate of potash: ice freely; beef-essence and milk-punch every half hour; applied tincture of iodine externally three times a day. 29th: Complete aphonia: tongue swollen: diphtheritic membrane extending below posterior arch; dysphagia extreme. 30th: Died at 4 P. M.

CASE 22.—Private John Parmenter, Co. K, 2d Pa. Provisional Art'y; age 20: was admitted July 26, 1864, with diphtheria. Applied volatile liniment and flaxseed poultices to throat: gave ten grains of chlorate of potash, fifteen drops of tincture of iron, two grains of sulphate of quinia and one-fourth of a grain of extract of belladonna every four hours: extra diet. 27th: Tonsils, uvula and soft palate covered with a dark ashy deposit. Sponged with tincture of muriate of iron morning and evening: gave twelve drops of tincture of opium in half an ounce of spirit of Mindererus every four hours; used a gargle of muriatic acid in sweetened water: applied powdered alum: gave milk-punch, whiskey and porter. 28th: High fever: pulse 98. 29th: Tonsils cleaning; ate a little toast and ice-cream. 30th: Died at 9.45 P. M.

CASE 23.—Private A. C. Wentz, Co. F, 83d Pa., was admitted June 7, 1864, suffering with sore throat. The patient came on foot to the hospital and seemed in fair condition; but a membrane was observed covering the fauces. Quinine in whiskey was given every two hours and tincture of iron applied every half hour to the fauces. On the 9th, after a hard spell of coughing, the membrane was ejected [see *Specimen* 391, Med. Sec., Army Medical Museum], and for thirty hours the patient appeared in good condition and likely to do well; but at the end of that time dyspnœa came on, and he died in three hours. No *post-mortem* examination was held.

In case 24, reported by Surgeon JOHN A. LIDELL, U. S. Vols., an opening through the crico-thyroid membrane was made but failed to save the patient. Failure also attended the only other recorded efforts to save the patient by surgical interference.*

CASE 24.—Private D. M. Brimmer, Co. H, 169th N. Y., a young soldier of good constitution, was admitted Feb. 26, 1863, with typhoid fever. He was treated by the tonic and expectant method, and did so well that on March 15 he was out of bed most of the time, though still pale, thin and weak. On the 16th he was attacked with sore throat. Next day, his case having assumed an unfavorable appearance, my attention was called to him by the attending surgeon, Dr. C. H. OSBORNE. His throat was swollen externally a good deal: countenance anxious and dusky; respiration hurried and rather difficult: pulse weak and about 120, and he complained of great debility. On depressing his tongue to examine the fauces a very offensive odor was exhaled. The tonsils, palatine arches and posterior fauces were covered with diphtheritic membrane of moderate thickness and dirty-gray color. Dr. OSBORNE had already cauterized the throat with a strong solution of nitrate of silver, and was administering quinine and iron, whiskey freely, along with beef-tea and any other nutrient that the patient could swallow. I ordered this treatment to be continued. Next morning he was decidedly worse; his neck was more swollen; he had greater difficulty in swallowing and the respiration was croupy to a marked degree: his pulse was weaker and more frequent and other evidences of debility were increased. As the morning wore away he lost the power of deglutition; he became more stupid; his countenance grew darker in hue and death by suffocation seemed to be close at hand. Under these circumstances, and as a remedy of last resort, I performed laryngotomy at noon. His neck was swelled so much that I was unwilling to attempt tracheotomy. As it was, the swelling embarrassed me a good deal by obliterating the

* See cases 1 and 16 of the *post-mortem* records.

landmarks by changed color of tissue, by increased thickness of soft parts to be cut through and by the constant oozing of a bloody liquid from the surface of the necessary incision, thus obscuring and at times hiding the parts from view; no artery required to be tied. On cutting through the crico-thyroid membrane I was enabled to withdraw from the larynx a considerable quantity of false membrane stained with blood. The patient breathed easily through the artificial opening and directly afterwards was able to swallow again; and an assistant, whose fingers were on the radial pulse, told me that the circulation rallied decidedly at the same moment. Not more than an ounce of blood was lost by the operation. The patient appeared to be nearly if not quite insensible to pain by reason of the increasing coma of suffocation. His breathing seemed to continue free and easy, but he died, apparently from exhaustion, four hours after the operation.

Post-mortem Records.—Observations were made and recorded in twenty-five cases, which are herewith submitted. In 1–3 the mucous membrane of the larynx was swollen and œdematous, but not covered with pseudomembrane, the diphtheritic infiltration being confined to the tonsils or to the fauces and epiglottis. In 4–7 pseudomembrane extended from the fauces and pharynx into the laryngeal passage; the last-mentioned case was complicated with swelling of the parotid glands and an abscess in the neck on the left side of the larynx. In 8–18 the larynx was affected and the trachea invaded; swelling of the parotids was noted also in the last of these cases. In 19–25 the exudation extended into the bronchial tubes, plugging in some instances their smaller ramifications. In 26 the condition of the pharynx and air-passages was not stated.

Case 1.—Private David Late, Co. K, 1st Vt. Cav.; age 19; was admitted Dec. 23, 1864, complaining of lassitude, chilliness, pain in the limbs, anorexia and jaundice. On the 28th his throat became sore, both tonsils and palatine arches, the soft and part of the hard palate participating in the inflammatory process; dyspnœa was apparent next day. On Jan. 1, 1865, a membranous exudation of some consistence hung from the uvula and on being detached left a clean, red, highly inflamed surface. The expectorated matters were very offensive, consisting of glairy mucus, blood and particles of membrane. The patient became asphyxiated on the 2d during a sudden paroxysm of dyspnœa. Tracheotomy was performed but failed to resuscitate him. *Post-mortem* examination: The *Specimen* [528, Med. Sec., Army Medical Museum], consisting of the tongue, palate, pharynx, larynx and one inch and a half of the trachea, was removed *en masse*. The velum palati was covered with a partially detached membranous exudation of some consistence, blackened externally by the preparations of iron which had been used medicinally and having beneath it some effusion of blood; the tonsils were covered with a grayish-white deposit, firmly adherent and extending into the follicles; the glottis, epiglottis and aryteno-epiglottidean folds were œdematous and there was some extravasation of blood in the larynx.—*Ass't Surgeon R. F. Weir, U. S. A., Hospital, Frederick, Md.*

Case 2.—Private Jos. Oldham, Co. G, 52d N. Y.; age 20; admitted Nov. 23, 1863. Died December 13. *Post-mortem* examination: The posterior portion of the epiglottis and pharynx was covered by a diphtheritic membrane; the cellular tissue of the larynx was œdematous and indurated; the upper portion of the first and the whole of the third lobe of the right lung were hepatized; other thoracic and abdominal organs normal.—*Ass't Surgeon H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 3.—Private Thomas Shea, Co. F, 4th Minn.; age 25; was admitted Feb. 16, 1865, with pneumonia. He progressed satisfactorily until the 21st, when white deposits appeared upon the throat. He died on the 25th. *Post-mortem* examination: Membranes of brain fully injected. Pharynx dark-purple; tonsils with patches of thick white deposit. Right lung crepitant but coated with yellow lymph; upper lobe of left lung solidified and bronchial tubes dark-colored. Heart adherent and some yellow serum in pericardium. Liver small, anæmic, with old adhesions; spleen soft, pale, granular; kidneys fatty.—*Third Division Hospital, Alexandria, Va.*

Case 4.—Private James Evans, Co. F, 48th Pa.; age 25; was admitted Feb. 27, 1863, having been sick for four weeks. His tonsils were ragged and ulcerated and there were small patches of exudation in the throat; he swallowed with difficulty. He had an oppression in the right lung, mucous râles over both sides of the chest and an offensive, purulent expectoration. On March 1 the dyspnœa increased and he became delirious and died next day. *Post-mortem* examination: General hypostasis. Brain reddish, firm, much congested; pia mater extremely injected. Base of tongue, half arches, tonsils, epiglottis, glottis, more than half the larynx and pharynx swollen and covered with white, stringy, semi-granular, firmly-adherent material, believed to be diphtheritic. Lungs congested,—right twenty-eight ounces; left twenty-one ounces; bronchial tubes dark-colored. Heart containing white clots in both ventricles. Liver irregularly congested; spleen twelve ounces and a half, bright red and very soft.—*Lincoln Hospital, Washington, D. C.*

Case 5.—Private Eli Jacobs, Co. B, 109th N. Y.; age 22; was admitted Jan. 22, 1864, with pneumonia. Warm fomentations, cups and blisters were applied to the chest, and tartar emetic, opium, senega and carbonate of ammonia prescribed, with milk-punch and nourishing diet. On February 9 a diphtheritic appearance was recognized in the throat. He died on the 11th. *Post-mortem* examination: A membranous formation was found in the fauces and larynx. The lungs were adherent throughout and hepatized in their lower lobes; the apex of the right lung was cicatrized. The kidneys were enlarged and fatty. [*Specimen* 46, Med. Sec., Army Medical Museum.] The other organs were healthy.—*Surgeon Edwin Bentley, U. S. Vols., Third Division Hospital, Alexandria, Va.*

Case 6.—Private Charles E. Bates, Co. G, 39th Mass.; age 26; was admitted May 15, 1864, with a gunshot wound of the left arm. He died November 2 of diphtheritis. *Post-mortem* examination: The mucous membrane of the larynx was swollen, almost completely closing the glottis; the diphtheritic membrane had in a great measure separated, only traces of it remaining.—*Jarvis Hospital, Baltimore, Md.*

Case 7.—Private Harrison Tibbetts, Co. A, 12th Mass.; age 24; was admitted June 1, 1862, with chronic diarrhœa. He recovered and was acting as wardmaster when, on October 11, he was attacked with diphtheria, which proved fatal on the 19th. *Post-mortem* examination: The pharynx, tonsils and velum palati were covered with false membrane and the larynx was lined throughout with the characteristic exudation. On the left side of the lower part of the larynx was an abscess containing about three ounces of offensive pus. The parotid glands were much enlarged and the surrounding cellular tissue œdematous.—*Hospital, Alexandria, Va.*

Case 8.—Private Caros O. Gibson, Co. H, 4th Vt.; age 31; was admitted Oct. 25, 1864, his right leg having been amputated for a gunshot wound received at Cedar Creek, Va., on the 19th. On admission the stump was healing kindly and the patient in good condition, but a tendency to sloughing, with some diarrhœa and homesickness, subsequently retarded his recovery. On November 22 he complained that for a day or two his throat had been somewhat sore; a slight diphtheritic deposit was observed on one of the tonsils. Quinine and whiskey were given, with tincture of iron internally and as a local application. The patient felt certain that his attack would end fatally. On the 24th the exudation was not very extensive on the palate but appeared to have extended into the left nostril. He died on the 26th, but not from asphyxia. *Post-mortem* examination: The false membrane extended about two inches into the trachea; the glottis was only slightly involved and there was but little exudation except on the tonsils and soft palate. [*Specimen* 446, Med. Sec., Army Medical Museum, shows the nasal mucous membrane coated with pseudomembrane.] —*Act. Ass't Surgeon Geo. W. Fay, Patterson Park Hospital, Baltimore, Md.*

Case 9.—Private Thomas Bromeling, Co. C, 106th N. Y.; age 24; was admitted July 10, 1864, with a gunshot wound of the knee-joint, received on the previous day, for which amputation was performed in the lower third of the thigh. Eight days later about half of the stump had healed, but about August 1 the appetite failed and profuse perspiration occurred. As pus from the posterior part of the stump was burrowing in the thigh a counter opening was made. On the 8th the patient complained of sore throat. Tincture of iodine was applied to the fauces and the cutaneous surface of the throat and a gargle of chlorate of potash and alum was prescribed. Next day a large diphtheritic deposit was formed on the palate and fauces, to which lunar caustic in substance was applied. Stimulants were given, but the patient died on the 11th. *Post-mortem* examination: The soft palate was coated with pseudomembrane, which lined the pharynx, larynx and trachea. [See *Specimen* 529, Med. Sec., Army Medical Museum.]—*Act. Ass't Surgeon George M. Paullin, Hospital, Frederick, Md.*

Case 10.—Private John B. Smith, Co. I, 13th N. H., was admitted Feb. 7, 1863, with debility and diarrhœa consequent on typhoid fever and measles. He improved under treatment and was able to be out of bed most of the day when, on March 11, he complained of sore throat and in the evening diphtheritic exudation had already occurred, although difficulty in swallowing and the return of liquids through the nose were not manifested until the following day. On the 13th respiration was quite laborious, the tonsils much swollen and the surrounding parts covered with false membrane which nearly closed the fauces. Some of this was removed by forceps with temporary relief; but towards evening suffocation again threatened and a second attempt was made, without success, to clear the throat. The feeble condition of the patient did not warrant the administration of nauseants. He was treated with quinine and tincture of iron, which latter was also applied to the fauces. He died on the 14th of apnœa. *Post-mortem* examination: The fauces were covered and the glottis and trachea lined throughout with diphtheritic membrane. [*Specimen* 13, Med. Sec., Army Medical Museum.] Pulmonary congestion was manifest.—*Ass't Surgeon H. B. Buck, U. S. Vols., Columbian Hospital, Washington, D. C.*

Case 11.—Private Michael Messner, Co. H, 8th N. Y., was admitted Jan. 22, 1863, with chronic rheumatism. He had, moreover, just recovered from a severe attack of pleuro-pneumonia and was pale and somewhat emaciated. On the 24th he complained of sore throat and his cough assumed a rough, hoarse character, and was brought on by every effort at speech. After a time dyspnœa set in, his countenance became anxious, pulse frequent and feeble, skin cold and bathed in clammy sweat. He died on the 27th. *Post-mortem* examination: The mucous membrane of the larynx and trachea was red and presented a few patches of adherent pseudomembrane; the submucous tissue was œdematous. There were pleuritic adhesions on the left side. The heart was fatty.—*Hospital, Alexandria, Va.*

Case 12.—Private E. Griffith, Co. D, 10th N. Y.; age 26; was admitted with typhoid fever Aug. 3, 1864. He convalesced sufficiently by the 15th to sit up a part of each day. He then became affected with sore throat, and on the 18th white patches were discovered on the tonsils. He was seized with a paroxysm of dyspnœa on the night of the 20th, and died asphyxiated before surgical assistance could be summoned. *Post-mortem* examination showed false membrane upon the sides of the fauces and larynx and extending a short distance into the trachea; the remainder of the trachea was congested; the lungs were filled with serum.—*Hospital, Frederick, Md.*

Case 13.—Private Charles Winslow, Co. A, 44th N. Y.; age 19; admitted from the field Oct. 21, 1864, with chronic diarrhœa and syphilis. Died November 6 of diphtheria. *Post-mortem* examination: Brain normal; spinal cord not examined. Two spots, half an inch in diameter, on each side of the uvula were covered with false membrane; the epiglottis was erect from œdema and its under surface covered with false membrane, which extended through the larynx about two inches into the trachea. [*Specimen* 440, Med. Sec., Army Medical Museum.] The heart and left lung were normal; the right pleural sac contained three ounces of serum and a small shred of loose floating lymph, but there was no adhesion; the lower part of the upper lobe was carnified posteriorly, but the remainder was healthy.

The liver, pancreas, spleen, kidneys, stomach, small intestine and colon were normal; the mesenteric glands were a little darker than usual.—*Act. Ass't Surgeon Thomas Bowen, Second Division Hospital, Alexandria, Va.*

CASE 14.—Private H. H. Goodwin, Co. G, 1st Mass. Cav., was admitted Feb. 1, 1864, from the Army of the Potomac with diphtheria. He died on the 3d. *Post-mortem* examination: The mucous membrane of the pharynx was covered with diphtheritic membrane. The epiglottis was much congested and ulcerated; the larynx and first two rings of the trachea were congested and covered with false membrane; the cavity of the larynx contained a large fibrinous plug.—*Act. Ass't Surgeon L. Dorsey, Harewood Hospital, Washington, D. C.*

CASE 15.—Sergeant George W. Baldwin, Co. I, 14th Conn., was admitted July 15, 1863, in a weak and exhausted condition, suffering from chronic diarrhœa and a gunshot wound of the hip, received at Gettysburg, Pa. The wound was in an unhealthy state and did not improve under treatment. On August 12 the throat became sore and the uvula and fauces much congested. Solution of nitrate of silver was applied and chlorate of potash with muriatic acid administered. Diphtheritic patches appeared on the 14th, large flakes of which were removed by the application of a solution of one drachm of iodide of zinc in one ounce of water; but the membrane extended downwards, and the patient died on the 15th. *Post-mortem* examination: The larynx and trachea were lined with false membrane. [*Specimen* 14, Med. Sec., Army Medical Museum.]—*Act. Ass't Surgeon John Dickson, Jarvis Hospital, Baltimore, Md.*

CASE 16.—Sergeant James W. Sutherland, Co. D, 1st Me.; age 24; was admitted Oct. 24, 1864, with a gunshot fracture of the femur, which in progress of time united and the patient improved in flesh and strength, although some sinuses continued to discharge. On the morning of May 24, 1865, his throat became sore, but no patches of a diphtheritic character were visible. At 10 P. M. the nurse was awakened by the groans and efforts of the patient to get breath. The tonsils were much swollen and the throat covered with diphtheritic patches. Other measures having failed, tracheotomy was performed at midnight with considerable relief; but dyspnœa returned, and death took place at 4 A. M. of the 25th. *Post-mortem* examination: The tonsils were greatly enlarged and the larynx and posterior nares covered with diphtheritic membrane which extended a considerable distance into the trachea. [*Specimen* 591, Med. Sec., Army Medical Museum.]—*Jarvis Hospital, Baltimore, Md.*

CASE 17.—Corporal William H. Vosberg, Co. H, 13th N. Y. Cav.; age 21; was admitted Aug. 16, 1862, with chronic diarrhœa. He improved under treatment, but on September 4 his throat became sore and his tonsils, uvula and soft palate red and swollen, the pulse being natural but feeble. Chlorate of potassa with muriatic acid was given internally and as a gargle. By the 6th a diphtheritic membrane covered the uvula, tonsils and epiglottis. Quinine, tincture of iron, beef-essence and stimulants were added to the treatment. At 8 P. M. the patient seemed moribund,—great dyspnœa, with rapid, thready pulse and coldness of surface; but a few hours later he rallied and slept well during the night. The urgent symptoms returned on the night of the 7th, and he died next morning. About fifteen minutes before death he vomited a large quantity of greenish liquid containing whitish shreddy matter. *Post-mortem* examination: The larynx and trachea were highly inflamed, but as no false membrane was found it was assumed to have been dislodged by the emesis.—*Act. Ass't Surgeon Pierre R. Holly, Douglas Hospital, Washington, D. C.*

CASE 18.—Private Sylvester Green, Co. D, 186th N. Y.; age 19; was admitted May 2, 1865, with fever and swelling of the parotid glands. On the 5th there was much swelling of the neck with increased dyspnœa and dysphagia, thready pulse, anxious countenance and profuse perspiration. He died asphyxiated on that day. *Post-mortem* examination: A perfectly-formed false membrane extended from the glottis to the bronchi; the lungs were emphysematous.—*Slough Hospital, Alexandria, Va.*

CASE 19.—J. T. St. John, Act. Ass't Surgeon, was admitted March 3, 1865, with diphtheria. He had been sick for eleven days prior to admission, and while en route to hospital was treated by Dr. W. P. PARR, who administered iron and stimulants and cauterized the throat with fused silver nitrate, thereby disengaging large masses of false membrane and enabling the patient to breathe and swallow with less difficulty; but the membrane was renewed and the subsequent use of the silver salt was not followed by benefit. On his arrival by steamer from City Point, Va., he was much prostrated; he had to be propped up in bed, and what he said could not be understood unless the ear was closely inclined to him; his countenance was anxious and slightly venous; partial paralysis of the left arm was observed and he complained of tenderness over the wrist; a grayish-white exudation covered the tonsils and soft palate. The iron, brandy and beef-tea which he had been taking were continued, and an emetic of ten grains of capsicum and a teaspoonful of mustard having failed to produce vomiting, sulphate of zinc was administered, but although some membranous shreds were dislodged the patient was not much benefited. A concentrated solution of capsicum was applied with a probang every third hour and was also used externally. 4th: Some shreds of the expectorated membrane are of firm consistence, being even somewhat cartilaginous; delirium during the night; deglutition impossible: continued but unsuccessful efforts to rid the air-passages of the obstruction. 5th: Respiratory murmur feeble over right lung: counter-irritation by mustard and turpentine on chest and a blister to each deltoid; persulphate of iron solution to the tonsils and larynx. 6th: Intellect unaffected; death impending; face and hands dusky. He died at noon. *Post-mortem* examination: From the soft palate, half arches, tonsils, pharynx, epiglottis and root of tongue a white or ash-colored substance, closely adherent to the originating tissue, extended downward, forming an interior tube in the trachea and bronchi. This membranous lining varied from one-fourth of a line to two lines in thickness and in parts it appeared as if laminated. In the upper part of the affected region the exudation was ragged—in the lower part smooth. The surface of the lower part of the main tubes covered by the membrane was scarlet, and in spots of a deeper scarlet fine granulation was considered to be present. The lungs were in parts crepitant, in others carnified and œdematous; the left lung, in addition, contained some small apoplectic clots and ecchymoses. In the bronchial tubes of the left lung a shred-like fibrinous substance was continuous with the abnormal lining of the trachea. In the right lung the bronchial tubes to those of the third magnitude, and even further, were occupied by hollow

fibrinous casts, and tubes of lesser magnitude not seen to be so occupied presented an abnormally white appearance. The right lung weighed thirty-two, the left twenty-eight ounces. The heart contained mixed clots in all its cavities. The brain was firm; the pia mater congested, two ounces of serum having escaped when the arachnoidal sac was opened; an arborescent spot of congestion was found on the floor of the fourth ventricle on the right side, above the origin of the auditory nerve; the right lateral ventricle contained a small quantity of liquid. [*Specimens* 585 and 586, Army Medical Museum, show the larynx and trachea with their abnormal lining and a portion of the lung with fibrinous casts in the smaller bronchial tubes.]—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Case 20.—Private David G. Hatch, Co. H, 13th N. H.; age 23; was admitted Dec. 30, 1862, with typhoid fever. On Feb. 23, 1863, he had high fever, pulse 144, and a dry hacking cough; his throat, lips and tongue were much swollen and his mouth and fauces dry and inflamed. He continued to take food till March 1, when he complained that he could not swallow. At this time the chest was dull on percussion and bronchial breathing was heard; respiration was painful and difficult, the pulse low, breath offensive and the extremities cold; acrid discharges came from the nose, sordes accumulated on the teeth and the expectoration was mixed with putrid masses. He died on the 3d. *Post-mortem* examination: The brain was pale and firm. The trachea, larynx, posterior half of the left side of the fauces, the pharynx on the line of the nares and the posterior part of the floor of the nares were covered with a fibrinous mass, grayish-white in the larynx and red in the trachea. [*Specimen* 7, Med. Sec., Army Medical Museum, shows a diphtheritic layer coating the posterior surface of the soft palate and the under surface of the epiglottis; it is notably present at the rima glottidis.] The right lung weighed thirty-nine ounces; its bronchial tubes were occluded with plugs of white fibrinous lymph, which, when detached with difficulty, revealed longitudinally striated mucous membrane, roughened and in places granulated; on section the tubes appeared as yellowish-white spots; the lower lobe was almost entirely consolidated; the middle lobe, shrivelled and partially carnified, had its main bronchus totally occluded by a large plug; the upper lobe was generally consolidated, but the bronchial plugs were less adherent and there were neither striæ nor granulations in the bronchi. Some of the bronchial glands were in a state of cheesy and calcareous degeneration. The heart was pale and contained fibrinous clots in both sides; nineteen drachms of brownish serum were found in the pericardium. The duodenum was stained; Peyer's patches were much congested and spotted; the valvulæ were thin and irregularly congested and the mucous membrane of a livid flesh-color. The large intestine was normal. The liver, fifty-nine ounces, was mottled, pale and softened; the spleen, seven ounces and a quarter, was mottled of a light-purple color, its trabeculæ distinct and firm and its substance pulpy; the pancreas firm and purple; the kidneys reddish flesh-colored and firm; the suprarenal capsules enlarged, straw-colored and of natural consistence.—*Ass't Surgeon Geo. M. McGill, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 21.—Corporal J. L. Blake, Co. I, 7th Me.; age 30; admitted Aug. 10, 1862, with diarrhœa. Died September 23. *Post-mortem* examination: The fauces and pharynx to the commencement of the œsophagus, the larynx, trachea and bronchi were inflamed and lined with pseudomembrane. The tissue of the lungs was healthy, but the bronchial tubes were filled with mucus, and some blood was effused into the interlobular connective. The heart, liver, spleen, pancreas and kidneys were healthy. The stomach was more or less inflamed throughout. The mucous membrane of the duodenum, jejunum and ileum were slightly reddened and stained with bile. The large intestine was exceedingly contracted and nearly uniformly pink.—*Act. Ass't Surgeon J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 22.—Private Henry B. Kern, Co. F, 52d Pa.; age 18; was admitted July 3, 1863, with a contusion which required no special treatment. He was taken with sore throat August 10, and died on the 15th. *Post-mortem* examination: The fauces, pharynx, trachea and bronchi were inflamed, their mucous membrane dark-red and covered everywhere with an ash-colored pseudomembrane; the inflammation extended to the bronchial tubes and even to isolated lobules of the lungs, the lobules affected being filled with a bloody fluid to the entire exclusion of air. The anterior inferior angle of the upper lobe of the left lung and the corresponding portion of the middle lobe of the right lung were congested for about two inches in extent. The remaining organs appeared to be healthy.—*Act. Ass't Surgeon J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 23.—Private Milo Bray, 4th N. Y. Batt'y; age 25; admitted Aug. 28, 1863. Died October 8. *Post-mortem* examination: The brain was firm and its vessels, especially those of the pia mater, injected. The larynx and trachea were lined throughout by false membrane, which covered both surfaces of the epiglottis; the underlying mucous membrane was of an intense purplish-red color. [*Specimen* 10, Med. Sec., Army Medical Museum.] The œsophagus was very pale. The right lung, twenty-three ounces, was well filled with air except in its third lobe, which was intensely congested, and in the lower part of its first lobe, which was carnified; the left lung, nineteen ounces, showed carnified portions here and there among healthy tissue and the bronchial tubes of its lower lobe contained a false membrane similar to that found in the trachea. The pleuræ enclosed twenty-six ounces of dark-red serum, contained chiefly in the right cavity. Mixed clots were found in the right cavities of the heart and venous clots in the left cavities, aorta, venæ cavæ and pulmonary artery; the pericardium contained eight ounces of straw-colored serum. The liver and intestines were healthy, the kidneys congested, and the spleen, which weighed twelve ounces and a half, was dark-colored and pultaceous.—*Ass't Surgeon H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 24.—Private Marcus L. Myers, Co. G, 10th Iowa; age 24; was admitted May 16, 1861, with the cervical glands much swollen and indurated, dysphagia and dyspnœa; pulse 110, small and quick. He died next morning. *Post-mortem* examination: Pseudomembrane lining the fauces and all the air passages; one piece of an arborescent appearance; mucous membrane much congested. Heart normal; fibrinous clots in both ventricles (conceived to have been the immediate cause of death). Spleen twice the normal size and friable.—*Hospital, Madison, Ind.*

Case 25.—Private John Feaster, Co. C, 7th N. Y., was admitted Aug. 17, 1864, on account of a gunshot wound; but he had indications of diphtheria, which became fully developed seven days later. His throat became swollen

and a film of white substance formed about the tonsils; food returned through the nostrils when attempts were made to swallow: respiration was difficult, but there was no cough. A gargle of tannin solution brought away a considerable amount of the film. Chlorate of potassa, muriate of ammonia and tincture of iron were prescribed. The patient died of suffocation on the 30th. *Post-mortem* examination: The trachea contained a tubular pseudomembrane which extended into the bronchial tubes. [*Specimen* 410, Med. Sec., Army Medical Museum.]—*Act. Ass't Surgeon Samuel Graham, Emory Hospital, Washington, D. C.*

Case 26.—Private Joseph Lester, Co. F, 15th Vt., was admitted May 2, 1863, with intermittent fever. On the 5th diphtheritic inflammation of the fauces was apparent, accompanied with aphonia, great depression, rapid pulse, 130 per minute, and semi-unconsciousness. Under alteratives, stimulants and beef-tea, with astringents locally, he improved until the 9th, when his pulse became weak and thready and his lungs congested. He died on the 11th. *Post-mortem* examination: Pleuræ healthy; right lung hepatized posteriorly; left lung diffusely congested; right side of heart flabby, empty; left side filled with blood; abdominal viscera healthy.—*Second Division Hospital, Alexandria, Va.*

Sequelæ of diphtheria are alluded to only in the following papers:

Act. Ass't Surgeon Isaac G. Porter, *Fort Trumbull, Conn., June* 30, 1862.—Among a few cases of diphtheria there was one, now on furlough, which, while not inordinately severe, left the patient with partial paralysis of the soft palate and œsophagus, which has given a decided nasal tone to his voice and causes frequent strangulation while swallowing his food. He is also highly anæmic and all his motions are tottering and uncertain.

Case 27.—Musician Robert D. Shook, Co. G, 5th Mich.; age 18; was admitted Aug. 30, 1863, having been attacked three days before with headache, fever, pain in the throat and stiffness and swelling of the neck. He had considerable fever of a continued type; pulse 100 and feeble; tongue coated with white fur; fauces completely covered with a yellow exudation, the surrounding mucous membrane being of a bright-red color; tonsils markedly tumefied; glands enlarged and neck swollen. The patient had no appetite and his bowels were constipated. Cathartics and a gargle of chlorate of potassa were prescribed; two days later quinine and iron were used. On the 7th the membrane had nearly separated; the appetite was good and the patient felt well but weak. On the 9th, when treatment was discontinued, there was a slight patch of membrane on the left tonsil. A difficulty of swallowing, from paralysis of the pharynx, was observed on October 1; there was also loss of power in the upper and lower extremities. Tonics, stimulants and moderate exercise were prescribed. He was discharged from service November 22, on account of paralysis, which necessitated the use of crutches.—*Central Park Hospital, New York City.*

Treatment.—The treatment adopted in these diphtheritic inflammations does not appear to have been satisfactory. When the disease, at its inception, was attended with acute febrile symptoms a purgative, usually a mercurial on account of the foul condition of the tongue, was administered, with neutral mixture, counter-irritation externally by sinapisms or liniment of ammonia, and a solution of chlorate of potash as a gargle: but when the pseudomembrane was observed this mild method of treatment was superceded. The application of the most powerful agents was considered justified in the endeavor to change the character of the inflammatory process, to destroy the infiltrated membrane or to remove it from its underlying connections. Naturally, when suffocation threatened the patient, the sight of a semi-detached pseudomembrane on the tonsils or epiglottis suggested that its removal might

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...eria with *post-mortem* notes have been published in the Medical Journals, as for instance:—P. R. Garvin, Ass't Surgeon, 40th Mass., reported the case of Private W. B., Co. F, of his regiment, who was admitted Dec. 31, 1864, with high fever, fetid breath and great swelling of ... covered with an ash-colored exudation. Local and general treatment was attended by apparent benefit for four days, when the ... with stupor and low delirium; the pulse ranged from 120 to 130; the throat had a dusky hue and the countenance became livid. ... days after admission. *Post-mortem* examination found the trachea inflamed and a large part of its surface covered by a false mem... into the bronchi. The exudation became thicker below and completely filled the right bronchus, where it was mingled with a ... matter. The right lung presented black patches at its base and anterior edge of the middle lobe. Recent adhesions were found ... gray hepatization in its lower lobe.—See *American Med. Times*, Vol. VIII, 1864, p. 91. Lewis H. Rodman, Medical Cadet, U. S. ... use of Private Draper, aged 16, who, while convalescing from typhoid fever in August, 1861, began to suffer from small ulcers of the ... of the throat. Three days later false membrane appeared on the palate; the pulse became quick and feeble; the skin hot and ... gh and dyspnœa followed the extension of the disease into the larynx. Treatment was of no avail. Death occurred suddenly seven ... of the first symptoms. *Post-mortem* examination: An ash-colored membrane extended from the tonsils and sides of the posterior ... nx and trachea to the bronchi. The lungs presented hypostatic congestion and commencing inflammation. Peyer's glands had ... the diphtheritic attack.—See *American Med. Times*, Vol. IV, 1862, p. 67. A. B. Mott, Attending Surgeon Soldiers' Home Hos... ... the case of Alden F. Page, Co. E, 2d Me., who was admitted June 25, 1862, with chronic rheumatism. Four days later he ... pain in swallowing. Next day a membranous exudation was observed on the tonsils and palate. Tonic and stimulant ..., with the use of chlorate of potash internally and locally. The pulse was 100, deglutition painful and the countenance ... at the exudation spread over the tonsils and palate and seemed to extend into the air-passages. Dyspnœa was extreme ... by asphyxia five days after the onset. At the examination a membrane was found lining the air-passages ...—*American Med. Times*, Vol. V, 1862, p. 133. J. H. Thompson, Surgeon 39th N. Y.—*Medical and Surgical Reporter*, ... account of a pseudomembranous disease that prevailed among army horses at Williamsburg, Va. The animals ... ning; but later in the day they refused to eat, and by evening they were unable to swallow and died in a few hours ... the mouth, larynx and trachea covered by false membrane in appearance like that of diphtheria in the human ...

afford relief. Sometimes the forceps was successfully employed to effect this. Cauterization with nitrate of silver occasionally disengaged large masses and enabled the patient to breathe and swallow with less difficulty. Emetics of mustard and sulphate of zinc, ipecacuanha and tartar emetic failed to bring relief, although sometimes, perhaps, dislodging shreds of the pseudomembrane. Among the direct applications to the site of the inflammation, so far as it could be reached, may be mentioned strong solutions of nitrate of silver, sulphate of copper, iodide of zinc, persulphate of iron, tincture of the muriate of iron, hydrochloric acid, ammonia and olive oil, tinctures of opium and iodine, strong infusions of cayenne pepper, powdered alum, etc. These swabbings were supplemented by gargling with dilutions of the same potent substances. There is abundant testimony to the inefficacy of these local applications. When a membrane became detached under their influence, or pending their use, the diphtheritic process was immediately re-established on the vacated site. Moreover, as they reached only a limited portion of the affected membrane, that lying superior to the laryngeal passage, they could obviate no danger save that from occlusion of the rima glottidis. Perhaps this danger, when imminent, might have been more effectually combatted by an opening into the trachea than by persistent swabbing with corrosives and irritants. Of course tracheotomy would have been attended with no benefit when the disease had extended into the bronchi and their ramifications; but in these cases no impression on the mucous membrane of the fauces and upper aspect of the larynx by caustics or other powerful agents would have affected the invaded bronchioles. Tracheotomy would have protected the patient, if needful, from suffocation by pseudomembranes in the larynx, and this is all that their effectual removal by corrosives would have accomplished.

Meanwhile, besides this active local treatment, counter-irritants were applied to the cervical region, although in some instances emollient cataplasms were used with inhalations of steam. Internally tincture of iron, quinine and chlorate of potash were administered freely, with as much beef-essence and milk-punch or other stimulants as the patient could be prevailed upon to swallow. But in most of the recorded cases the fatal ending was not averted. Unfortunately there is no record of the many cases that recovered. It would be of interest to know whether the active local treatment above mentioned was instituted, or whether, as in some of the recoveries at the Alexandria, Va., hospitals, the local applications were restricted to a solution of nitrate of silver containing ten grains in an ounce of water and a gargle of diluted tincture of iron. In this connection the uniform success claimed by Surgeon EGBERT, U. S. Vols., for his plan of treatment, submitted below, is of particular interest, as it involved no more irritant application to the inflamed parts than a solution of chlorate of potash in an infusion of hydrastis. The successful use of ice, reported by Surgeon HAMMER, U. S. Vols., and of the slightly alkaline vapors from slaking lime, by Act. Ass't Surgeon MCELDERRY, also involved the disuse of irritant local applications.* The records are meagre, but they do not favor a local treatment that would be productive of a dangerous laryngitis in a healthy subject. The following papers are all that have been discovered relating in general terms to the treatment of diphtheria:

* HENRY MCELDERRY, Act. Ass't Surgeon,—*Medical and Surgical Reporter*, Philadelphia, Vol. XIV, 1866, p. 344,—gives a favorable report of the use of the vapor arising from hot water poured upon lime. The case, that of a child six years old, at Fort McHenry, Md., in April, 1866, was severe in its general and local symptoms and had advanced to a state marked by difficult and labored respiration. Local applications to the diseased parts had given no good results. A large handful of lime was then put into a pitcher into which half a pint of boiling water was afterwards poured. The child's face was held over this that the fumes might be inhaled. Meanwhile a dessertspoonful was given every two hours of a mixture containing two drachms of chlorate of potash, two fluid drachms of tincture of iron, half a drachm of aromatic spirit of ammonia and six fluid ounces of lime-water. Immediate relief followed the inhalation, and after this had been used twice, at intervals of two hours, the breathing became easier and the swelling of the throat considerably reduced. This improvement ended in recovery five days after the onset of the disease. Dr. MCELDERRY's attention was called to this remedial measure by a communication from A. GEIGER, of Dayton, Ohio, published in a previous issue of the journal cited.

Surgeon M. R. GAGE, *25th Wis., Camp Randall, Wis., Dec.* 31, 1862.—Diphtheria we treat mildly or energetically, according to the form in which the attack shows itself. If the symptoms are of an inflammatory grade, as shown by headache, pain in the loins and slight rigors, we give a mild cathartic and use as a gargle solution of chlorate of potash, also counter-irritation by sinapisms, solution of ammonia or oil of turpentine, to the region of the throat externally. But if the case be malignant in its type and the powers of life rapidly depressed by the circulating poison, stimulants and tonics are promptly resorted to—brandy, tincture of muriate of iron, quinine, etc.—together with local stimulating applications to the internal parts affected so far as they can be reached. We use for the latter purpose nitrate of silver, tincture of iron, tincture of iodine and creasote, and have but little choice among them. Some of these cases of malignant diphtheria *will die* whatever may be done. The system is at once overwhelmed.

Surgeon J. M. BATES, *13th Me., Ship Island, Miss., Sept.* 27, 1862.—During the months of May and June we had twenty-five or thirty cases of diphtheria of a malignant form, which in a majority of cases proved fatal in spite of tonic and stimulant treatment with quinine, tincture of iron, chlorate of potash, brandy, whiskey, etc.

Surgeon AUGUSTUS R. EGBERT, *U. S. Vols., Fort Humboldt; Cal., July* 3, 1863.—The only violent disease for the last three months in this country has been a combination of diphtheria and typhoid fever; but none of the cases have occurred at this post. I will mention in brief the treatment which I find invariably successful: A wet bandage is applied to the throat and the following gargle prescribed for use every two or three hours. Pour a pint of boiling water on a drachm of the root of Hydrastis Canadensis; when cold strain and dissolve in the infusion two drachms of chlorate of potash. When the tongue is dry a pill consisting of one grain of blue-pill and one of ipecacuanha is administered every three hours until it becomes moist. After the third, sometimes second day, milk-punch or egg-nog is given freely. I have been invariably successful, as well as those who have followed this plan, while those who did otherwise lost more than half their cases.

Surgeon A. HAMMER, *U. S. Vols., St. Louis, Mo., Sept.* 11, 1863.—I take the liberty of bringing to notice a case of considerable importance that occurred in my hospital, in which there was used a new remedy. On September 1 I was called by Dr. LEFFINGWELL to see a patient suffering from diphtheria. The patient had complained the evening before of great dyspnœa and painful sensations about the throat which had been relieved by the application of a solution of nitrate of silver. I found the case one of well-marked and extensive diphtheria; the tonsils, soft palate and uvula on both surfaces being covered with thick grayish-white, continuous, croupous exudations. Knowing the uncertainty of our present treatment of this insidious disease, I concluded to prescribe the swallowing of small bits of ice continuously, as I had seen it recommended in a journal article by a French surgeon. Next day the diphtheritic exudations were more marked and the case aggravated; but to give the treatment a fair trial I ordered its continuance, and in addition ice compresses around the neck. On the 3d the progress of the disease had been arrested and parts of the membranes thrown off by coughing. The ice was continued for two days more, during which time the exudations became steadily thinner, and on the 8th recovery was perfect. The patient, Private James A. Mitchell, of Co. I, 2d Wis. Cav., at the time of this attack had just recovered from a severe remittent fever. Should the ice prove as beneficial in other cases as in this it would be a great blessing to mankind. I have no reason to doubt that the exudative processes are checked by the action of cold upon the capillaries. From the result of this treatment, if there be a doubt left in any professional mind, it will be now apparent that diphtheria is not a constitutional but a local disease. In similar croupous exudative processes on other parts of the body the ice will no doubt produce similar effects, and in future I shall not hesitate to apply it externally and internally in croup, there being no difference between the morbid processes of both diseases excepting in the seat of the affection.

IX.—PNEUMONIA.

The statistical facts relating to inflammation of the lungs as an army disease have already been submitted in treating generally of diseases of the organs of respiration. The 61,202 cases that occurred among the white troops during the war period have their distribution throughout the months and years indicated in the diagram facing page 722. The 14,738 deaths are similarly distributed in the diagram facing page 20. Regional prevalence is shown in Table LVII.* The rates of prevalence and mortality derived from these cases have been stated and compared with corresponding rates among the colored troops, the Confederate armies and the Union and Confederate prisoners.† Many diseases were of more frequent occurrence than pneumonia, but only diarrhœa and dysentery and the continued fevers furnished a larger death-list.‡ It has been shown, however, in discussing the points of interest connected with these grave camp diseases, that pneumonia was present and caused or hastened the fatal issue in 21.6 per cent. of the deaths from diarrhœa and dysentery§ and in 68.3 per cent. of those attributed to the continued fevers;‖ the mortality from measles also

* Page 724, *supra*.
† *Supra*, p. 719 *et seq.*
‡ See Table II, page 11, *supra*.
§ See Part II of this Work, page 465.
‖ See *supra*, page 470.

resulted largely from inflammatory processes in the lungs. In fact, the importance of pneumonia as a destroyer of life in our camps and hospitals can hardly be overestimated.

Clinical Records.—The records of pneumonitic cases are usually incomplete. A more or less satisfactory view of the patient is afforded on his admission into hospital, and an occasional entry subsequently enables the reader to fill up the gaps in the history. In many cases the reporter was satisfied with entering the diagnosis without referring to the symptoms on which it was based. The records are especially deficient as regards the history of relapses, recurrences and aggravations of the diseased conditions when perfect recovery did not follow the subsidence of the primary attack. On this account it has been deemed advisable to summarize the reports and give in full only a few cases as illustrative specimens.

Thus, 1 and 2 have been selected as acute uncomplicated cases ending favorably; 3–5 have pleuritic complications; 6 and 7 present typhoid symptoms, but recover; 8 and 9 illustrate the progress of adynamic cases to a fatal termination; 10 and 11 end in pulmonary gangrene and 12 in empyema; in 13 the diseased action persisted and led to a diagnosis of consumption; 14 was characterized by the sudden access of wild delirium; 15, a catarrhal case in which venesection gave slight but passing relief; 16–18, catarrhal cases following measles.

Case 1.—Private R. S. Hopkins, Co. D, 73d Ill.; admitted Sept. 12, 1862; skin hot and dry; pulse 138; tongue much coated; intense pain in right lung; rusty sputa; crepitant râles; exaggerated respiration in left lung. Gave of tartar emetic four grains, acetate of morphia three grains, sweet spirit of nitre half an ounce, syrup of lemon one ounce, distilled water three ounces; a tablespoonful every hour. Applied blister over right lung. 15th: Doubled the dose of the antimonial. 16th: Pulse 120; tongue coated; fever high. Gave two grains each of calomel and Dover's powder every three hours. 17th: Better; pulse 103; skin cooler; sputa loose but bloody. 18th: Pulse 92; appetite improved. Gave two doses of nitrate of potash and Dover's powder during the day and in the evening whiskey toddies. 19th: Pulse 73, full and soft; slept well by the aid of morphia; skin and extremities cool. Gave citrate of iron and quinine in Catawba wine. 20th: Pulse and skin nearly natural. 24th: Tongue clean and moist; no cough. He recovered and was returned to duty November 12.—*West End Hospital, Cincinnati, Ohio.*

Case 2.—Sergeant Hiram J. Bond, Co. A, 4th Ill. Cav.; age 29; admitted April 20, 1864, with pneumonia of the right side; cough; pain in chest; scanty, viscid expectoration mixed with blood; quickened respiration; fever; accelerated pulse; some dulness on percussion; crepitant râles and absence of vesicular murmur. Gave a cathartic, nitrate of potash, digitalis and tartar emetic; bled the patient; in the declining stage gave expectorants. He fully recovered and was furloughed May 16.—*Lawson Hospital, St. Louis, Mo.*

Case 3.—There was but one case of pneumonia during the past quarter,—a violent case in a dissipated subject. The patient stated that the day before he had a chill which was followed by fever and cough, with much pain in the side, so severe that he could scarcely breathe and did not sleep any during the night. He had violent cough with the characteristic rusty sputa; severe pain in the left side; great dyspnœa; high fever; intense headache; pulse full, strong and frequent; skin hot and dry; face livid and anxious; respiration hurried; bowels constipated and urine scanty. 1st day: Gave four compound cathartic pills and applied a blister over the seat of pain. 2d: Bowels well opened; the blister relieved the severe pain in the side; other symptoms unaltered. Gave brandy, eight ounces, morning, noon and night, with good nourishment. 3d: Very restless and sleepless during the night; symptoms unchanged. Gave twenty grains of sulphate of quinia, with half a grain of tartar emetic, morning and evening; continued brandy and beef-tea. 4th: All the symptoms much improved; fever subsiding; pulse soft; skin moist; breathing easier; sputa mingled with less blood; secretion of urine copious. Diminished the quinia and tartar emetic by one-half; continued brandy and beef-tea. From this day complete convalescence was established and the patient soon recovered his strength.—*Surgeon Allen F. Peck, 1st N. M., Ft. Stanton, N. M., Dec.* 31, 1862.

Case 4.—John Dalton, Co. C, 28th Mass.; admitted April 10, 1863, complaining of chilliness and pain in every part of body; headache; bowels moved by a cathartic yesterday; tongue coated. Half a drachm each of solution of acetate of ammonia and sweet spirit of nitre four times a day; low diet. 11th: Restless; pulse 90; tongue coated white; skin hot; no appetite; much thirst; pain in right lung; dulness over left nipple; crepitant râles distinct. Tincture of veratrum viride, three drops four times a day and Dover's powder at night. 12th: Rested badly; pulse 110. Solution of acetate of ammonia two drachms and sweet spirit of nitre half a drachm three times. 13th: Restless; headache; pulse quick, 120; continued treatment. 14th: Pulse quick; headache; delirious during the night; rubbing sound heard over upper part of left thorax, râles below and dulness over all; sputa a little tinged; tongue dry. Treatment continued, with fifteen drops of turpentine three times a day. 15th: Less delirium last night; pulse 104; two stools; tongue less furred and dry. Continue turpentine and give ipecacuanha one grain, sweet spirit of nitre half a drachm, three times. 16th: Appears better; pulse feeble, 80; slept a little; bowels regular; skin cool and moist. Solution of acetate of ammonia one drachm, sweet spirit of nitre half a drachm, fluid extract of ipecacuanha four drops, three times a day. 17th: Slept pretty well; pulse regular; no rubbing sound and dulness less marked. Continue treatment and give half an ounce of whiskey three times a day. 19th: Blisters applied yesterday afternoon over front and back of left side. Sulphate of quinine one grain, whiskey three ounces, every three hours. 26th: Pulse 60; tongue clean; appetite good; a little dulness at apex of left lung. Rub croton oil above and below clavicle. Sent to general hospital to-day.—*Regimental Register, 28th Mass.*

CASE 5.—Private Eli J. Keeler, Co. G, 17th Conn.; age 33; while recovering from wounds received at Gettysburg, Pa., July 1, 1863, and on light duty as nurse, became sick March 9, 1864: Sharp pain in right side over nipple; high fever; cough; no hereditary phthisis; father, 68 years old, had fourteen out of fifteen sons in active service; mother 71 years old. 11th: Pulse 120, small and compressible; skin hot and dry; face flushed; respiration 80; sputa copious, frothy, somewhat tenacious and bloody; tongue moist and coated; bowels open (had taken sulphate of magnesia); urine scanty and high-colored; decubitus, mostly on right side; sharp pain in right side in breathing or coughing; dulness and tubular respiration over upper part of lung anteriorly in axillary region and posteriorly; large moist râles anteriorly above and friction anteriorly below right nipple, with slight moist râles and absence of vesicular breathing posteriorly. Applied six wet cups over root of right lung; milk diet. Gave small doses of nitrate of potash, calomel and ipecacuanha every three hours. 12th: Pulse 112, stronger, but compressible; skin less dry; respiration 48; sputa scanty and not so bloody, tenacious; tongue coated, moist; urine augmented; five stools; sharp pain under right nipple; right lateral decubitus; dulness and tubular breathing in right subclavian region; friction below; severe pain in liver, especially in upper part of right lobe; dulness in right axilla less marked; friction and prolonged expiration over lower axillary region; well-marked dulness and tubular breathing over upper and posterior part of lung; friction over lower part posteriorly. Gave repeated doses of nitrate of potash and Dover's powder. 13th: Pulse 104, very small and compressible; skin moist and cool; respiration 60; sputa scanty, tenacious; tongue white and moist; urine augmented and depositing lithates; pain in mammary region continues, relieved by bending forward; dulness and tubular breathing in upper part of lung less marked; friction well marked anteriorly and posteriorly in axillary region. Extra diet. 14th: Pulse 80, full, stronger; skin moist and warm; respiration 32; sputa only slightly tinged; four to five stools; tongue cleaning, moist; pain in mammary region much relieved; appetite returning; tubular breathing replaced by large and small moist râles. 16th: Moist sounds diminishing in extent; sputa copious but tenacious. Applied blister. 17th: Much better; blister remained on eight hours and a half. 18th: Physical signs of pleuritic effusion; vesicular breathing returning in apex of lung. 21st: Return of pain over right lung. Transferred to Knight hospital, New Haven, Conn. [arriving on the 30th. Furloughed on the 31st. Returned to hospital April 12. Returned to duty May 7].—*Satterlee Hospital, Philadelphia, Pa.*

CASE 6.—Private M. McDonall, Co. C, 5th N. J., was taken Feb. 23, 1862, with typhoid pneumonia involving a large portion of the lower part of the right lung, with some implication of the left lung; crepitus was clearly audible and fever, pain, bloody sputa, etc., were present. Ordered blue mass ten grains and half-ounce doses of liq. potassæ citratis. 24th: Pulse 144, feeble; muttering delirium; sputa streaked with blood; passages very dark, bilious; system much prostrated. Mustard cataplasm to chest; beef-tea and brandy punch every alternate hour. 25th: Improving; pulse 100; respiration easier; no delirium. A stimulant every four hours and beef-tea at similar intervals. 26th: Pulse 90: tongue cleaning; pain in lower part of right lung. Pitch and cantharides plaster; treatment continued. 27th: Pulse 86. Senega and wild cherry administered and stimulants decreased. March 24th: Gaining strength slowly.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 7.—Private Joseph Burns, Co. I, 43d N. Y., was admitted Aug. 10, 1862, almost moribund with typhoid pneumonia. Gave milk-punch, beef-essence, cough syrup; extra diet. After much suffering from bedsores he began to improve, but when well advanced toward recovery was attacked with erysipelas, which prostrated him again. Applied lead-water and laudanum and gave quinine and wine whey. November 25: Convalescent. Jan. 1, 1863: Fat, but unfit for field service. September 4: Transferred to Invalid Corps.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 8.—Private James Wilson, 14th N. H., was admitted Sept. 25, 1864, with typhoid pneumonia: Much pain in head, back and limbs; skin hot and dry; pulse quick; tongue furred and dryish. Gave Dover's powder at once; repeated in six hours. 26th: Gave turpentine. 27th: Some cough; pain and dulness on right side; low muttering delirium. Gave antimony quarter of a grain, sulphate of magnesia one drachm, every two hours; applied fomentations to chest. 29th: Involuntary stools. Added whiskey and opiates. He lay in a deep stupor and was aroused with difficulty. 30th: Died.—*Third Division Hospital, Alexandria, Va.*

CASE 9.—Private Nathaniel Davenport, Co. I, 26th Mich.; admitted Jan. 27, 1863, having been ill two weeks: Delirium; headache; face livid; skin hot and dry; pulse 100 and feeble; tongue dry; bowels loose; abdomen tumid and tender; thoracic symptoms trifling at first but afterwards aggravated; cough frequent and painful, with slight viscid, bloody expectoration, subsequently becoming mixed with pus; diminished resonance over right side anteriorly, with subcrepitant ronchus below and puerile respiration above. Gave iron, senega, carbonate of ammonia and morphia every four hours, with dry cups and turpentine stupes, followed by a blister. The sputa became copious and fetid and the patient emaciated by night-sweats and exhausting diarrhœa. Gave tonics, stimulants and nutritious diet. He died April 30.—*Third Division Hospital, Alexandria, Va.*

CASE 10.—Private Michael Dowd, Co. B, 12th N. Y.; admitted March 14, 1863. For six weeks prior to admission, during most of which time he was in New York city on furlough, he suffered from cough and pain in the left chest: Sputa copious, dark-colored and fetid; dulness posteriorly over the upper portion of the lower lobe of the left lung, with feeble respiratory murmur and moist bronchial râles. Gave chlorate of potash and morphia, porter, whiskey and good diet. The cough and expectoration gradually diminished, the fetor continuing. The patient gained strength gradually and on July 22 was transferred to Lovell hospital, Portsmouth Grove, R. I. [whence, on Jan. 29, 1864, he was returned to duty].—*Ladies' Home Hospital, New York City.*

CASE 11.—Private Benjamin McKean, 2d Cal. Cav.; age 35; of good habits and constitution, was admitted March 28, 1865, with acute pneumonia, which was accompanied with gangrene from the very first. The disease was mainly confined to the right lung, but during its progress the left lung became involved. Treatment consisted of a cathartic followed by acetate of lead, Dover's powder and chlorate of potash. At the end of ten days stimulants and tonics

became imperatively necessary, owing to the large quantity of excessively offensive matter expectorated. His diet from the first consisted of beef-tea, with eggs, etc. At this period he commenced taking milk-punch every three hours. The patient's breath was so offensive as to taint the whole ward. At the end of a month hectic was developed, with diarrhœa, night-sweats, œdema of the feet and legs and more or less anasarca. His emaciation was very great, although he took large quantities of food after the first four or five weeks. About May 1 he began to improve, the gangrenous expectoration progressively diminishing, and on July 1 was returned to duty sound and well.—*Surgeon C. S. Wood, U. S. Vols., Sacramento, Cal.*

Case 12.—Private Thomas E. Faun, Co. M, 15th Kans. Cav., was admitted July 19, 1864, from the post hospital, where he had been under treatment for pneumonia since February 29. In April an abscess opened midway of the seventh rib on the right side and discharged about four ounces of purulent matter daily, spurting quite freely during coughing; the right side of the chest was much atrophied. Quinine, whiskey and cod-liver oil were ordered. October 30: Somewhat improved. November 30: Discharge decreasing. December 31: Improved in flesh; able to dress himself. He continued to improve slightly under ferruginous tonics and good diet until he was discharged July 14, 1865.—*Kansas City Hospital, Mo.*

Case 13.—Private Nathan C. Barlow, 93d Ill., was admitted March 24, 1864, with an acute attack of pneumonia of the right side. He was blistered and treated satisfactorily with veratrum viride every two hours for five or six days. Tonics and expectorants were given during April, with cod-liver oil and beer; but he continued feeble and affected with cough and pain in the side. He was discharged from service Oct. 1, 1864, on account of consumption.—*Hospital, Quincy, Ill.*

Case 14.—James Fisher, Co. H, 26th Mich.; admitted Dec. 16, 1862. Respiration quiet; slight mucous sounds in right lung, diminishing from below upwards. A blister was applied; cough-syrup was given every two hours and powders of ipecacuanha, calomel and opium every four hours. He continued in the same quiet state, expectorating high-colored sputa from time to time, and taking crackers and tea, until 2 A. M. of the 17th, when he suddenly awakened from sleep, swearing and making desperate efforts to leave his bed. Force was required to hold him. His profanity continued without interruption until he died. In the forenoon his face was pinched and his hands and feet cold and livid; his respiration was quick and there was rattling in the larger air-tubes; the pulse was quick and feeble, and sordes had accumulated thickly on his lips and tongue. He shut his teeth against medicine and food. Morphine quieted his delirium and he ceased his struggles to get up, though he continued to talk. In an attempt to give him drink he indented the spoon with his teeth. He died at 6 A. M. of the 18th.—*Hospital, Elmira, N. Y.*

Case 15.—Private George Kellers, Co. B, 5th Mich., was admitted Nov. 7, 1861, having had acute bronchitis with high fever for twelve days prior to admission: Pulse 106; face flushed; respiration 32; tongue dry and brown in centre; cough frequent; uneasiness in lower part of the chest, amounting to dull pain on full inspiration; viscid and bloody sputa. Applied blister and gave Dover's powder eight grains, calomel one grain. 8th: Pulse 120, quick; respiration 32; tongue dry and brown; skin hot; countenance anxious; expectoration scanty, viscid and slightly tinged with blood; lips blue and nostrils dilated on inspiration. Gave small doses of quinine, calomel, turpentine and chlorate of potash, whiskey occasionally and milk as desired; applied dry cups to back. In the evening gave veratrum viride and ipecacuanha. 9th: Pulse 106, feeble; respiration 44, labored; lips dark-purple; countenance anxious; nostrils widely distended on inspiration; thick mucous expectoration. Applied dry cups to back; gave brandy; half a grain of calomel every hour; dressed blister with mercurial ointment. 10th: Pulse 84, full and soft; respiration 43, short; no respiratory murmur in right lung; dulness with but little expansion. Continued calomel and stimulants. 11th: Pulse 84; dyspnœa urgent, somewhat relieved by the removal of ten ounces of blood by venesection. 12th: Dyspnœa increased. Gave quinine eight grains daily; brandy punch. Removed a few ounces of blood by venesection. 16th: Some expectoration; respiration 30; countenance less anxious; tongue cleaning; pulse 120, soft. 17th: Pulse 120; respiration 32; tongue clean; free purulent expectoration. 2 P. M.: Much pain in right side; great dyspnœa and much anxiety of countenance; profuse sweating. 18th: Died.—*Hospital, Alexandria, Va.*

Case 16.—Private Henry K. Eastman, Co. I, 31st Me.; age 18; contracted measles about April 5, 1864, while at Soldiers' Rest, Alexandria, Va.; admitted to Third Division hospital April 23, and transferred to this hospital May 7. Health much impaired; pain in left side; tongue coated; fever; slight dyspnœa; quick pulse; dulness on percussion and absence of respiratory murmur in posterior and inferior parts of left lung. Gave milk-punch, two ounces, every two hours. 12th: Dulness; crepitation in right lung posteriorly and inferiorly. Gave of sulphate of quinia two grains every three hours; continued milk-punch. 19th: Severe cough; sleeplessness. Added anodynes. 25th: Less dulness posteriorly, increasing anteriorly in left side; muco-purulent sputa. Continued treatment; gave brandy, half an ounce every three hours, instead of milk-punch. June 25th: Physical signs of disease persist. Gave tonics and astringents. July 1: Furloughed. 18th: Transferred to hospital at Augusta, Me. September 28: Returned to duty.—*Turner's Lane Hospital, Philadelphia, Pa.*

Case 17.—Private Richard P. Lundy, Co. G, 120th Ill.; age 28; was received from St. Louis without medical history Aug. 26, 1863. He states that he had measles eight months ago, and has since suffered from pain in the chest and lumbar region: Body emaciated; tongue clean, pointed; bowels regular; urine red; appetite poor. Elixir of calisaya given with each meal. September 14: No improvement. Calisaya continued and belladonna applied to lumbar region. October 13: Pain in left side of chest; pain and sense of fulness in frontal region. 30th: Condition unaltered. Gave iodide of iron and syrup of tolu in addition to calisaya. November 5: Pulse 90, small; extremities cold; palpitation and feeling of weakness in cardiac region. Treatment continued, with moxa on lumbar region. 25th: Neuralgic pain in right side of head. December 24th: Impulse of heart increased, second sound not clear; pulse 108; pain in left side of chest; cough and progressive emaciation. 29th: Varioloid. Sent to pest-house. He

was given tonics, cod-liver oil and wine, but the cough and expectoration continued and his emaciation and debility increased. He was discharged June 25, 1864, for phthisis pulmonalis.—*Hospital, Quincy, Ill.*

Case 18.—Private William Hymnes, Co. M, 22d Pa. Cav.; age 21; was admitted April 9, 1864, with measles. He caught cold, after which the measles retroceded and pleuro-pneumonia of a typhoid type was developed: Pulse 120 and thready; skin hot and dry; tongue coated white, with centre brownish and margins red; respiration short and hurried; countenance pinched and anxious; pain lancinating in left hypochondrium, extending to nipple; tenderness over bowels; dulness on percussion, especially over left chest; dry râles; vocal resonance marked beneath clavicles; expectoration scanty and thin. The typhoid condition disappeared quickly under the use of oil of turpentine, with stimulants and light nutritious diet. Effusion into the pleural cavity took place, absorption, resolution and probably adhesion, with some consolidation of the left lung. Gave flax-seed tea with lemon-juice and cough mixture. A large bedsore formed on the lumbar region four or five inches in extent, eating in deep ragged fissures to the bone, undermining the superficial tissues with deep gangrenous pockets and exuding abundantly a thin fetid ichor. It was dressed with chlorinated poultices and balsam of fir. A strong natural effort was made to recuperate, assisted by iron and wine, but colliquative diarrhœa set in with hectic fever and night-sweats. He died June 3.—*Cumberland Hospital, Md.*

Of one hundred and thirty cases in which the symptoms were noted with some precision, eighty were acute pneumonias and fifty recurrences or sequences of the acute attack.

The cause, when any is assigned, is said to have been exposure to cold and dampness. Relapses during convalescence are in several instances attributed to cold from throwing off the bedclothes at night, exposure while washing in the bath-room or dampness from recent scrubbing of the floor of the ward.

In six of the acute cases the disease was reported as having been ushered in by chills or rigors, and in three by febrile action and vomiting before the development of chest symptoms; but as the pneumonia was usually well established when the patient came under the observation of the recorder, its early symptoms were seldom noted except in regimental practice or when an inmate of a general hospital was seized, as in cases 4 and 5 of the above selection. The febrile movement preceding or accompanying the chest symptoms was generally well marked. Of fifty-six cases in which the pulse-rate is specified thirty-four presented a maximum of 100 to 120 per minute; in others, in which the number of beats is not stated, the pulse is characterized as *frequent, rapid, accelerated, quick, full, strong* or *corded*. In an exceptional instance, with distinct pneumonitic symptoms, the maximum rate recorded was 65. Occasionally a morning remission was noted. Epistaxis occurred in two of the cases: In one a full, corded pulse, with much oppression of the breathing, was relieved by the bleeding supplemented by cupping; in the other the hemorrhage took place on the fifth day, continued at intervals for thirty-six hours, and although ultimately suppressed, contributed largely to the fatal termination. The *hot skin, flushed cheeks, headache, furred tongue, anorexia, thirst* and *scanty urine* which accompanied the accelerated pulse appear frequently in the reports. In one case the flush on the cheeks and neck was characterized as *bright and erysipelatous*. Headache, restlessness and inability to sleep culminated in sthenic delirium in but four of the acute cases,—for one of which see case 4, submitted above.

The locality of the thoracic pain is generally stated, but its character seldom. In some instances it is recorded as *dull*, and in a few as *sharp* or *severe;* in the latter the friction sounds of pleurisy are frequently, but not always, concomitant. The cough is usually described in the reports as *slight, dry, suppressed, considerable, severe*, and sometimes as *harassing, painful* or *distressing;* the sputa as *adhesive, glairy, viscid, tenacious*, occasionally *mixed* or *streaked with blood*, but more frequently *tinged with blood, rusty, pneumonic, orange-colored, like prune-juice*, and in an instance of concurrent jaundice *tinged with bile*.

The interference with the function of the lungs occasioned the conditions expressed as *respiration hurried, short and hurried, short and quick, frequent, quickened* or *labored*,

Numerical statements are usually 30 to 40 per minute, but 80 respirations are recorded in case 5, submitted above, in which the pleural membrane was involved. Sometimes the interference was also manifested by *duskiness of the countenance* or *lividity of the lips*, and occasionally dyspnœa is seen to have been urgent by such statements as *expression anxious, nostrils dilated, obliged to sit up in bed*, etc.

With dulness on percussion over the affected part there was usually some obscuration or absence of the vesicular murmur, with rude bronchial or tubular breathing, and, perhaps, exaggerated respiration in the unaffected parts. Fine crepitant râles are frequently reported. Pleurisy was indicated in eight cases by friction sounds and in four by effusion, in one of which the thoracic wall was distended.

After lasting from three to eight days the febrile symptoms suddenly abated, pain becoming relieved and the breathing easy, with free or increased renal secretion, in which the return of the chlorides is sometimes noted. In favorable cases the patient, within a month of the onset, was returned to duty with vesicular respiration re-established in the recently affected part of the lung. But a relapse from indiscreet exposure occasionally delayed the return to duty for ten days longer.

The so-called *typhoid* symptoms appeared in the progress of twenty-four of the eighty acute cases. In some, these, consisting of a *weak* and *rapid* perhaps *fluttering pulse, blackening of the tongue* and *great prostration*, were speedily removed by appropriate treatment; but in others, notwithstanding the most liberal use of stimulants and concentrated nourishment, a steady and more or less rapid progress to a fatal issue is recorded. Death occurred from asthenia in some cases, with *cold sweats, involuntary stools* and *muttering delirium*, unaccompanied by marked symptoms of the disorder of the lungs; but in most instances the pneumonic condition was manifested by *hurried breathing* and indications of imperfect æration such as *duskiness of countenance, drowsiness, semi-unconsciousness* and, finally, *coma*.

The following extracts will indicate the manner in which this adynamic tendency was usually brought to the notice of the Surgeon General's Office:

Surgeon A. W. McClure, *4th Iowa Cav., near Helena, Ark., Dec.* 31, 1862.—Within the last two weeks pneumonia has prevailed to a considerable extent. The disease is of an adynamic type and difficult of management, attacking usually those somewhat broken down by malarious disease. Three have died from this cause. I have treated them with quinine, Dover's powder, carbonate of ammonia and milk-punch, with mustard over the affected lung.

Ass't Surgeon W. L. Tolman, *10th Mo. Cav., near Vicksburg, Miss., March* 31, 1863.—The greatest fatality has attended cases of pneumonia. Typhoid symptoms and nervous prostration were present in nearly every case, so that an expectant and supporting plan of treatment was found to be necessary.

Surgeon R. W. Pease, *10th N. Y. Cav., Havre de Grace, Md., March* 31, 1862.—During the month of January pneumonia prevailed quite extensively. It arose from colds contracted on the passage from Elmira to Gettysburg and from the unventilated and crowded quarters in which the men were placed. The fatal case assumed a typhoid character, as did many others in which the termination was more fortunate. It is pertinent to remark here that company B, which suffered greatly from typhoid pneumonia, arising out of poorly ventilated quarters, was made the most healthy company in the regiment by introducing Mackinnell's ventilators into its quarters. These consist of two hollow shafts, the inner one extending *below* the outer one in the room and *above* the outer one outside the roof. Two of these were placed in the carriage factory occupied as a barrack by this company, after which sickness rapidly diminished among the men until scarcely a case was reported. These ventilators were afterwards placed in the barracks erected for the regiment, and this, together with careful policing of the camp, gave us unusual exemption from diseases of a serious character.

Surgeon H. W. Brown, *4th Corps d'Afrique, Port Hudson, La., April* 5, 1864.—Pulmonic disorders are very prevalent and have a tendency in this latitude, and particularly in the negro, to assume *ab initio* a severe typhoid type. Consequently the results of this class of diseases, typhoid pneumonia for instance, are unfavorable; I should say the fatal cases form about thirty per cent. of the whole. I have found pneumonia very common among colored soldiers.

Many of the cases, however, resulted neither in a satisfactory recovery nor in death by asthenia and apnœa as the immediate consequence of the acute attack. Instead of the

re-establishment of healthy conditions in the lung there remained in some of these an impaction of the air-cells or consolidation of the pulmonary tissues, giving continuance to slight constitutional disturbance, dulness on percussion and abnormal auscultatory sounds, with some pain, cough, shortness of breath and liability to an extension and aggravation of the diseased condition.—in fact, to the establishment of a lobular or secondary pneumonia. In others the inflammatory processes that persisted on the subsidence of the primary attack may be assumed to have been chronic or exudative, involving the separation of sound from diseased parts by inter-stitial growth or by the walling in of softened tissues and metamorphic products. In either event the case was of a serious character and the patient exposed to many dangers before a return to comparative health, if the injury to the lung was fortunately of a nature to permit of this favorable result. Typhoid symptoms might occur during any temporary febrile accession. Emaciation and long confinement led to the formation of bedsores. Diarrhœal attacks were specially dangerous in these cases; but the congestion of the enteric mucous membrane, mentioned so frequently, as will be seen hereafter in the *post-mortem* records, does not appear to have been intimately connected with the pneumonic processes. Diarrhœa is mentioned in the progress of but forty of the one hundred and thirty cases at present under consideration; and the medical treatment was occasionally responsible for the flux. Hæmoptysis was recorded in but one of the chronic or secondary cases, and, although there was no hereditary tendency to tuberculosis, the physical signs of tubercle are said to have been well marked. Many patients with persisting lung trouble characterized by cough and purulent or muco-purulent sputa sometimes mixed with blood, and attended with debility and tendency to hectic, were discharged from the service as consumptives. Similar cases in the Confederate hospitals were retained in service by the surgeons, as the policy of their government was to hold every man for such duty as he could perform, and many of these were eventually restored to apparently vigorous health.*

The physical signs of these chronic pneumonias included dulness on percussion and various sounds expressed on the records as *sub-respiration, tubular breathing, sibilant râles, mucous râles, crepitation* and *pectyloy*. The last-mentioned sound was present in two cases: In one death took place with symptoms similar to those of 139 of the *post-mortem* records, in which the lung was said to have been destroyed by suppuration; in the other it was probably due to the formation of a cavity by the rapid liquefaction of a mass of the lung tissue,—this case terminated in recovery after a prolonged convalescence, during which the patient was entered as a consumptive at one of the hospitals.

Surgeon J. E. Sawyer, 27th Iowa, in a report from Jackson, Tenn., dated April 30, 1863, makes note of a case of chronic pneumonia in which the patient declined to be considered sick:

> One singular case consisted of what ought to be called chronic hepatization of almost the entire left lung and of the lower portion of the right. The young man, of good habits and aged about 20, came from picket duty and reported himself as merely ailing slightly, but hardly worse than he had been for two or three weeks before. Physical examination revealed at once the above condition fully developed. Percussion was as dull as over the liver, and respiration entirely out of the question. The history showed he must have been in that condition for some length of time, but how long is quite conjectural. Though feeble and short-winded he refused to be confined to bed a single day. He has been carefully examined by a number of surgeons, who agree as to the pathology. The engorged con-

> [illegible] patients, some of whom had suffered an attack of acute pneumonia while others had never been confined to bed, [illegible] exhibiting evidences of chronic solidification of a portion of a lung, with considerable emacia- [illegible]

dition continued about two months, yielding gradually to blisters and croton oil externally, with the internal use of whiskey, carbonate of ammonia and quinine.

Erysipelas occurred in the progress of three of the one hundred and thirty cases, *mumps* in one, *variola* in two, *tonsillitis* in one, *suppurative parotitis* in one—a case of prolonged duration, *tubercle* in one, *dysentery* in one, *jaundice* in one and *aphonia* in four. One instance of aphonia, occurring suddenly and from an unknown cause, was treated by blistering the back of the neck, with what success is not stated, as the man was shortly afterwards discharged. In the three other cases the loss of voice was probably due to laryngeal inflammation, as reference is made to hoarseness and a stridulous cough. Aphonia, sometimes mentioned in the typhoid cases, is referable to prostration and dyspnœa,—in some instances instead of *aphonia* the record has it that the patient could not speak above a whisper.

In none of these cases is there an indication of the intercurrence of pericarditis. Friction sounds were heard in three of the cases characterized by delirium, but in one they were *on the right side from the axilla downward*, in the second *over the upper part of the left thorax* and in the last *over the base of the left lung*.

Under unhygienic conditions pneumonia, like catarrh, assumed such a prominence in certain regiments as to be considered due to an epidemic influence. Surgeon D. PORTE SMYTHE, 19th Texas, has recorded with precision an instance of this kind, in which the command, reduced by previous attacks of measles, mumps and remittent fever, and by the fatigues of an exhausting march of three hundred miles in a hot season, became suddenly exposed to cold and affected, apparently in consequence, with a pneumonitic tendency.

This officer's regiment, and others of Walker's division which were associated with it in its experience of pneumonia, were composed chiefly of young men from the non-malarious sections of Western Texas. Measles with pulmonary complications and a subsequent epidemic of mumps preluded a march of three hundred miles at the close of a hot, exhausting summer, into a malarious country at the height of its sickly season. About two hundred men, or 18 per cent. of the regiment, were seized with remittent fever and left at various points on the route. While in bivouac at Little Rock a sudden snow-storm came on during the night, after a warm day, and occasioned numerous cases of severe catarrh, which passed rapidly into obstinate pneumonias. During November the regiment had five hundred cases of sickness in a strength of nine hundred officers and men. Two hundred of these were cases of pneumonia, of which 50 per cent. were catarrhal, 40 per cent. croupous and the remaining 10 per cent. of cerebral and erysipelatous types, which were very deadly. The cerebral, which was at first mistaken for meningitis, as it was characterized by rigors, headache and but little pulmonary disturbance, proved fatal with convulsions and delirium in from twelve to twenty-four hours. In some of the erysipelatous cases the inflammation seized upon the pharynx and air-passages and suffocated the patient without giving time for the recognition of the pulmonary complaint; but in others the erysipelas was developed subsequent to the pulmonary symptoms and appeared more as an accidental complication. In the robust cases tartar emetic was chiefly used, and alterative doses of mercury in those which were not decidedly asthenic. Free cupping relieved the lung symptoms, but early and extensive blistering was productive of the best results. Bleeding was practiced at first in the cerebral cases, in the belief that a meningitis was under treatment; but neither this nor the cupping and blistering of the chest and sinapisms to the extremities, which followed a recognition of the nature of the disease, were of any avail.

Similar causes induced similar effects among the colored troops. Surgeon IRA RUSSELL, U. S. Vols., has placed on record some valuable observations on pneumonia as it appeared among them* at Benton Barracks, Mo., in the early part of 1864. Six regiments in process of formation were quartered at the post.

From January 1 to May 1, 784 cases of pneumonia were treated in the hospital, and of these 156 were fatal. There were also 675 cases of measles, with 130 deaths resulting mainly from pulmonary complications. Surgeon RUSSELL attributed these pneumonias chiefly to cold. The frequency and fatality of the disease varied with the character of the weather. A few warm days moderated the violence of the epidemic, and finally, with the advent of warm weather in May, it suddenly subsided. Among the predisposing factors he enumerates malaria, overcrowding, an epidemic influence and measles. The epidemic influence is considered to have been manifested by the illness of physicians and nurses who had not been greatly exposed to the vicissitudes of the weather and the other causes mentioned. Some intelligent surgeons formed the opinion that the disease was actually contagious. In barracks men occupying the same bunks with those affected were more liable to be attacked than those more remote.

*See his paper in the *U. S. Sanitary Commission Memoirs*, New York, 1867, p. 319 *et seq.*

Surgeon RUSSELL divided the pneumonic cases into three classes: *Congestive pneumonias, typhoid pneumonias* and *pleuro-pneumonias.* In the *congestive* form the patient suffered for several days with catarrhal symptoms attended with mental dulness. This was followed by a severe chill, like that of pernicious fever, accompanied by great prostration and pain in the head, back and limbs. The state of depression continued for twelve to forty-eight hours, when, if death did not close the scene, an asthenic fever ensued, attended with cough, expectoration which soon became copious and muco-purulent, more or less stupor and occasionally boisterous delirium. Death speedily occurred, and was as a rule preceded by coma. The *typhoid* variety was usually ushered in without a severe chill. Its adynamic character was manifest from the first. Chest symptoms were so slightly marked that but for the physical signs pneumonia would hardly have been suspected. With the dry, brown and cracked tongue and feeble and frequent pulse there was dulness over the affected parts of the lungs with mucous or subcrepitant râles; but fine crepitation was seldom heard. Cough was generally neither severe nor frequent. Expectoration was sometimes scanty and at other times copious; at first it consisted of viscid mucus, but it soon became muco- or sero-purulent with a fetid and disagreeable odor. *Pleuro-pneumonic* cases were frequently remarkable for the absence of pain in the pleura during the stage of active inflammation; but sometimes the pain was severe. Relapses, consequent on slight exposures, improper indulgence or change of weather were frequent and fatal. Pleurisy with copious effusion often complicated cases of the typhoid variety,—64 of 150 such cases had pleurisy.

Pericarditis is not noted as having been observed clinically in any of these varieties, and what is more singular, no *post-mortem* mention is made of the pericardium, although the condition of the lungs and pleura in a hundred fatal cases was carefully noted. This appears to have been an oversight, for Surgeon G. S. PALMER, U. S. Vols., superintendent of hospitals at Benton Barracks, in a report dated March 14, 1864, gives a tabular statement of the *post-mortem* appearances in 200 fatal cases of disease among the colored men. In many of these the diagnosis is not stated, so that it is impossible to determine from the record whether the patient died of pneumonia or measles, and although pneumonia is given as the fatal disease in 73 cases the consolidations may have been in many the result of catarrhal processes. The condition of the pericardium was noted in most of these cases. Generally it contained an excess of liquid,—quantities varying from five to eight ounces are frequently mentioned, and in one case sixteen ounces are said to have been found. The sac is recorded as having been engorged in one case and adherent in another; it contained bloody serum in four cases in quantity from one to six and a half ounces; and in two cases the inflammatory action was manifested by the presence of, in one, four ounces of serum and lymph, and in the other nine ounces of exuded lymph and purulent matter. Pericarditis was therefore probably as frequent a complication of pneumonia among the colored troops as among the white soldiers.*

The POST-MORTEM RECORDS of cases reported as pneumonia show that death in the majority of instances resulted not alone from hyperæmic or inflammatory processes in the pulmonary tissues, but from these in conjunction with similar processes affecting particularly the pleural membranes, bronchial tubes or pericardium. With the production of these congestive or inflammatory results the malarial, typhous and tuberculous cachexias and the specific cause of measles were apparently often connected. The recorded lesions differ much in individual cases. This variety in itself renders difficult a systematic presentation of the cases; but the difficulty is occasionally enhanced by doubts concerning the actual condition of the affected organs, referable to a want of precision in the recorded statements.

The hospital case-books and medical descriptive lists contain 435 cases recorded after *post-mortem* observation as having terminated fatally by pneumonia; of these 300 were probably cases of lobar pneumonia and 135 of secondary or catarrhal inflammation.

LOBAR PNEUMONIAS.—Among the 300 cases of apparently acute lobar pneumonia are 213 in which, with or without concurrent pleurisy, the lungs were more or less congested, hepatized or infiltrated with a pus-like liquid when not, as in a few instances, collapsed or compressed by excessive pleuritic effusion. It has been deemed unnecessary to present the whole of these cases in detail, as the condition of the lungs and other organs in them will be embraced in a summary of the lesions of the acute lobar cases, and their general character may be fully appreciated by selections including all those that possess points of interest irrespective of the lobe or lobes implicated in the pneumonic processes. The pneumonia was unilateral in 59 of the 213 cases; both lungs were affected in 154. Pleuritic inflammation complicated more than one-half of the cases. The selections submitted in illustration of these 213 cases are 69 in number, as follow:

*See *infra*, page 781.

Twenty-two cases in which the post-mortem record is prefaced by ante-mortem notes, indicating the general course of the disease.

Case 1.—Private Moyordis Herrand, Co. A, 1st Mich. Eng'rs; age 22; admitted April 11, 1864, in low condition. Pulse 150, soft and irregular; tongue dry; surface covered with profuse cold sweat; dulness over right lung and lower portion of left lung; mucous râles in right lung; diarrhœa. He improved under stimulant and supporting treatment until the 19th, when he became restless, with frequent pulse and great anxiety, which increased until death on the 26th. *Post-mortem* examination: Hepatization of the posterior and lower portion of the right lung and recent firm pleuritic adhesions. Hepatization of the posterior portion of the left lung; congestion anteriorly; slight recent pleuritic adhesions. Heart healthy. Liver nutmeg; spleen very large.—*Hospital No. 8, Nashville, Tenn.*

Case 2.—Private John Helm, Co. F, 114th Colored Troops, was admitted Aug. 18, 1865, having been affected for five days with slight pain and cough with blood-tinged expectoration. Consolidation of the right lung and pleuritic effusion were determined by the physical signs. The expectoration assumed the color and consistency of coagulated blood. Death occurred on the 28th, after a profuse expectoration of blood and mucus. *Post-mortem* examination: The right pleural cavity was distended with bloody serum which pushed the lung upward and compressed it into half its usual size; the lung was of the consistency and color of coagulated blood, its tissues breaking down and escaping from the fingers in the attempt to remove it. The heart was normal; the liver and kidneys larger than usual and fatty.—*Act. Ass't Surgeon H. Raphael, Hospital, Brownsville, Texas.*

Case 3.—Private Hilman Tuttle, Co. K, 14th W. Va.; age 24; a large robust man; admitted March 25, 1865, with syphilis; was about to be returned to duty when, on the night of April 30, he awoke, sprang suddenly from bed complaining of choking, and coughed violently as if about to strangle. He became comatose in a few minutes, lying on his right side with his limbs flexed, breathing laboriously and a sero-bloody fluid issuing from his mouth and nostrils at each respiration; face swollen and livid; pulse full and strong. He died May 1. *Post-mortem* examination: Lungs thoroughly saturated with a mucous and serous bloody fluid. Liver and spleen slightly enlarged and congested.—*Cumberland Hospital, Md.*

Case 4.—Private William Vaughan, Co. H, 10th Mich.; age 18; was admitted from Belle Isle, Va., per flag-of-truce boat "New York," March 24, 1864. He had been captured at Knoxville, Tenn., Jan. 22, 1864, and was sick with diarrhœa during all the time of his imprisonment. On admission he was very feeble and much emaciated—in fact a mere skeleton brought into the ward on a stretcher. He had a distressing cough but was too weak to expectorate; pain in the right side, over which there was dulness with bronchial respiration; thin offensive passage from his bowels every fifteen minutes; his mind was flighty, pulse small and quick and tongue furred. The patient was sponged with warm vinegar and water and supplied with clean clothing. Beef-essence and brandy toddy were given at short intervals; a sinapism was applied to the right side and a cough mixture prescribed consisting of ipecacuanha, muriate of ammonia, syrup of wild-cherry bark, morphia and mucilage. The cough and diarrhœa became lessened and the mental condition improved; but the pulse gradually failed, and he died on the 27th. *Post-mortem* examination: The chest only was examined. The right lung was coated with recent lymph and adherent in part to the costal pleura; its substance was non-crepitant, solid and heavier than water; blood flowed from its upper part on section; a small quantity of liquid was found in the pleural sac.—*Act. Ass't Surgeon S. J. Radcliffe, Hospital, Annapolis, Md.*

Case 5.—Private James Dodge, Harris's Mo. Batt'y; age 28; was admitted Dec. 21, 1864, with a lung disease, caused by exposure during his service in the Southern Army since 1861. Two weeks before admission he became sick with fever and pain in the chest and his legs began to swell: Tongue coated and brown; bowels loose; pulse 100; respiration hurried; severe cough with expectoration; appetite small; pain in right side; legs badly swollen. He grew worse rapidly, and died on the 25th. *Post-mortem* examination: Emaciation; œdema of feet and legs. Hepatization of right lung; effusion in right pleural cavity. Blood broken down and thin. Slight congestion of bowels.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

Case 6.—Private Michael Peters, Co. D, 56th Pa.; age 51; admitted Oct. 30, 1863, with pleuro-pneumonia. He breathed with difficulty and was much depressed. Tubular respiration with large moist râles was heard over the left lung, which was dull on percussion; there were also signs of pleuritic effusion on the right side. Quinine, carbonate of ammonia and nitrate of potash were given, with whiskey, nourishing diet and Dover's powder at night. The expectoration was scanty, tenacious and blood-tinged. A blister was applied on November 1. On the 4th the patient's face was mottled and his pulse feeble; he complained of no pain and coughed but little; he was disposed to get out of bed and desired to have his clothes. He died on the 5th. *Post-mortem* examination: The right pleural cavity contained by estimate half a gallon of serum mixed with pus and lymph flakes which compressed the lung backwards; the lung was collapsed, darker in color than natural and its bronchi contained a frothy reddish mucus. The anterior surface of the left lung was covered by a thick padding of lemon-colored lymph six inches long, three broad and one-half inch thick; the left pleural cavity contained a pint of pale-yellow serum; the lung was much congested and softened throughout its posterior and lower portions. Both lungs were adherent to the walls of the chest at various points posteriorly. The other organs were not examined.—*Act. Ass't Surgeon Edmond G. Waters, National Hospital, Baltimore, Md.*

Case 7.—Recruit Joseph Peters, 29th Colored Troops; age 20; was admitted Feb. 20, 1865, having been sick for several days with pneumonia of the right side. He had a full strong pulse and severe cough, with rusty viscid sputa. A poultice was applied and expectorants administered. He became restless on the 25th and complained of much pain. Dover's powder was given. On March 5 there was dulness over the lower part of the left lung and some crepitation was heard; the breathing became labored. On the 8th the patient was weak and restless; his pulse feeble; skin cold and freely perspiring. Stimulants and beef-extract were given every hour; a blister was applied

to the left side, and two grains of calomel with opium were administered hourly for six hours. Next day his skin was warm and he felt easier; but the pulse became small, the breathing irregular and labored. He died on the 12th. *Post-mortem* examination: The right pleural sac contained twenty-eight ounces of serum mixed with pus and the greater part of the lung was infiltrated with pus; the lower portion of the left lung was hepatized.—*Act. Ass't Surgeon S. D. Twining, L'Ouverture Hospital, Alexandria, Va.*

Case 8.—Private David Hamp, Co. B, 26th Mich., was admitted Feb. 19, 1863, with pneumonia of an asthenic type. Cough was frequent and painful, expectoration difficult, the skin hot and dry, the tongue darkly coated, the bowels constipated and the pulse frequent and compressible. Diminished resonance was observed over the lower portion of the right lung and moist râles were heard anteriorly over the right side of the chest. A mercurial cathartic followed by an emetic of ipecacuanha and subsequently by small doses of calomel, opium and ipecacuanha, were employed, with dry cups and turpentine stupes locally. The patient grew steadily worse and died on the 28th, notwithstanding the administration of stimulants. *Post-mortem* examination: The middle and lower lobes of the right lung were engorged; the lower lobe of the left lung was hepatized. There was a copious effusion into both pleural sacs and some plastic exudation on the right costal pleura; there was also some serous effusion into the pericardium. —*Third Division Hospital, Alexandria, Va.*

Case 9.—Private Marion Hague, Co. D, 14th Ind.; age 25; was admitted Oct. 25, 1864, with pneumonia. The patient was very feeble and restless; he had a severe cough, pain in the right side and hurried respiration; his voice was extremely weak. Dover's powder was given every three hours and mustard applied to the chest. He died on the 29th, after attempting to rise from bed. *Post-mortem* examination: Both lungs were adherent and in large part engorged, some portions of the right being hepatized. Four bird-shot were found encysted in the lower part of the costal pleura, but no cicatrix indicated their point of entrance. The heart was normal; a fibrinous clot extended from its right ventricle into the pulmonary artery. The liver was enlarged and contained some encysted bird-shot; the spleen also was much enlarged. The mucous membrane of the stomach was inflamed. Peritoneal adhesions bound all the abdominal organs together. [*Specimen* 444, Med. Sec., Army Medical Museum, shows a section of the hepatized right lung from which the adherent pleura has been partly reflected.]—*Surgeon E. Bentley, U. S. Vols., Third Division Hospital, Alexandria, Va.*

Case 10.—Private Benjamin F. Graham, Co. I, 11th Vt.; age 38; was admitted Feb. 8, 1865, having been affected with pleuro-pneumonia for some weeks. He was very weak and emaciated; his countenance sallow and eyes sunken; pulse 100 and feeble; he had been blistered for pain in the left side of the chest. He had a cough with slight expectoration; dulness over the left side anteriorly and posteriorly and over the right side posteriorly; slight subcrepitant râles on the left side, with a rough friction murmur which, posteriorly, was somewhat indistinct; on the right side, posteriorly, absence of murmur. On the 10th, at 3 P. M., the patient got up and walked across the ward and back again to his bed, a distance of ten yards. He died suddenly half an hour afterwards. *Post-mortem* examination: Patches of lymph were found on the left lung which was attached to the walls of the thorax by old adhesions; the upper lobe was consolidated, the lower congested. The apex of the right lung was slightly indurated, the remainder of the upper lobe, together with the middle lobe, was healthy, whilst the lower lobe was abnormally large, condensed and apparently entering into a state of suppuration.—*Act. Ass't Surgeon A. Walsh Emory, Patterson Park Hospital, Baltimore, Md.*

Case 11.—Private William A. Martin, Co. H, 75th Ohio, was admitted Aug. 30, 1863, with pneumonia. He had been taken prisoner at Gettysburg, Pa., July 2, 1863, and had suffered much from cold, wet and want of food on his journey thence to Richmond. On admission he had a short hoarse cough, rusty sputa, pain mostly in the right lung, a rapid pulse, 112, hot and dry skin, dry and brown tongue and two or three thin stools daily; there was dulness with bronchial respiration over the greater part of the right lung. He was treated with acetate of ammonia, wild-cherry, ipecacuanha and morphia, with sinapisms to the chest and nourishment; but his condition remained unchanged. About 5 P. M. of September 1 he said he felt better and desired to be shaved and have his hair cut. The nurse acceded to his request; but streams of frothy mucus came gushing from his nose and continued for more than half an hour; dyspnœa increased and rapid prostration ended in death about 8 P. M. *Post-mortem* examination: The right lung was hepatized, the left engorged, and both adhered strongly to the walls of the chest; the pleural sacs contained a small quantity of serum. The liver was very large. The other organs were healthy.—*Act. Ass't Surgeon S. J. Radcliffe, Hospital, Annapolis, Md.*

Case 12.—Private Peter St. George, 2d Vt. Batt'y; age 22; was admitted Oct. 29, 1863, with double pneumonia, contracted about the 23d whilst exposed on Belle Isle, Va. The onset was by chill. On admission the pulse was small, 130; respiration 60; lips, ears, nose and fingers blue; dulness over the chest was not great, but bubbling sounds during respiration could be heard in all parts of the room. Tartar emetic in small doses every two hours, with squill, ipecacuanha and sinapisms were employed, but he died October 31. *Post-mortem* examination: The left lung was purple,—the lower lobe darker than the upper,—crepitant all over except a strip two and a half inches wide at the base of the upper lobe, a section of which sank in water; there was no adhesion. The right lung adhered by recent lymph and was very large and dark-purple in color, the lower and middle lobes hepatized, the upper crepitant but congested. The pericardium was normal; the left side of the heart and the cardiac veins were gorged with black blood. The abdominal organs were normal except the spleen, which was much enlarged.—*Act. Ass't Surgeon E. C. Mattock, Hospital, Annapolis, Md.*

Case 13.—Private Garret Huff, Co. G, 10th Ind. Cav.; age 19; admitted March 4, 1864, the sixth day of an attack of pneumonia. Slight delirium; high fever; irritability of stomach; rusty sputa; extreme pain in and dulness over lower lobe of right lung, with bronchial respiration and mucous râles; crepitation in middle lobe. He died on the

7th. *Post-mortem* examination: Heart normal, fibrinous clots in both sides. Right pleura extensively adherent; lower lobe of right lung hepatized, middle lobe engorged; lower lobe of left lung engorged. Stomach and small intestine somewhat congested.—*Act. Ass't Surgeon M. G. Rogers, Hospital, Madison, Ind.*

Case 14.—Private Robert Black, Co. G, 8th Me.; age 41; was admitted Feb. 13, 1864, with headache, dyspnœa and pain in the chest; skin hot and somewhat jaundiced; pulse 100, soft and rather small; tongue coated white; bowels quiet; eyes injected and yellowish; bronchial respiration heard over the upper lobe of the right lung; mucous râles in the lower lobe and puerile respiration with roughness in the left lung. A blister was applied to the chest and repeated doses of blue-pill, opium and ipecacuanha prescribed. Brandy and quinine, one grain every hour, were given on the 15th, and subsequently carbonate of ammonia; but the dyspnœa became extreme, the expectoration bloody, the pulse frequent, small and feeble and the circulation in the extremities imperfect. He died on the 19th. *Post-mortem* examination: The right lung was largely adherent by recent firm adhesions; it was in a state of gray hepatization and its apex and base were disintegrated; the pleural cavity contained six ounces of serum. The left lung was hepatized in its upper and congested in its lower lobe. The bronchial tubes were inflamed. There were firm coagula in both ventricles of the heart.—*Act. Ass't Surgeon Charles T. Reber, Hospital, Beaufort, S. C.*

Case 15.—Private Alfred McCabe, 63d Ill., was admitted March 5, 1864, with headache, pain in the back and limbs and slight fever, which had been ushered in on the previous day by a chill. On the 8th the fever increased, with cough and pain, crepitation and dulness in the right side. He died on the 14th. *Post-mortem* examination: Right lung much congested; left congested; effusion in both pleural cavities. Heart flabby, clot in right auricle: two ounces of fluid in pericardium.—*Hospital No. 8, Nashville, Tenn.*

Case 16.—Private Henry C. Chase, Co. G, 79th Ohio, left Nashville Feb. 27, 1864, in good health,—weather rainy and cold; the troops slept in the rain. Admitted March 1. Pulse 145; tongue dry and red; lungs congested, right impervious to air except in apex and larger tubes, upper lobe of left lung in similar condition. Died March 5. *Post-mortem* examination: Body well nourished. Right lung hepatized and universally adherent; upper portion of left lung congested, lower normal; no adhesions; some liquid in cavity.—*Tullahoma Hospital, Tenn.*

Case 17.—Private Reuben W. Fernner, Co. B, 54th Pa., had been sick three weeks and was quite anæmic on admission, July 25, 1864. Pulse 90, feeble; cough dry and frequent; respiration difficult and hurried; pain in left side; soreness in intercostal spaces; dulness on percussion; tongue clean; appetite poor; able to walk about. Gave tonics and expectorants. August 3, while ascending the steps to the dining-room, he became exhausted and fell; he was removed to bed and died shortly afterwards. *Post-mortem* examination: Lungs adherent and much congested; middle lobe of right lung hepatized. Heart pale, thin, soft and containing dark clots.—*Cumberland Hospital, Md.*

Case 18.—Silas Hibler, a farmer of Gasconade County, Mo.; age 25; had an attack of pneumonia in June, 1864, and has suffered from its effects since then. He was conscripted and made his way from Missouri to give himself up to the Union authorities. Exposure during the journey caused an aggravation of his lung trouble. On admission, December 4, his tongue was red and corrugated; bowels loose; pulse 120, not very full; respiration hurried; cough severe and attended with expectoration; left lung consolidated. The looseness of the bowels continued and the lung symptoms became aggravated. He died on the 15th. *Post-mortem* examination: Hepatization of left lung and of base of right lung; effusion in left pleural cavity. Clots in both auricles. Bowels distended with gas; mesenteric and solitary glands diseased. Blood impoverished.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

Case 19.—Moses Lockard, a farmer of Van Buren County, Ark.; age 31; was admitted Dec. 6, 1864, with typhoid pneumonia. He had been afflicted for several years with chronic inflammation of the liver and spleen. He deserted in October from the 10th Ark. Cav., and attributes his present sickness to exposure while *en route* from Missouri. Tongue coated and brown; bowels normal; pulse 120, full; respiration hurried; expectoration rusty; pain in right side; dulness; crepitant râles. He died on the 11th. *Post-mortem* examination: Hepatization of right lung and of posterior portion of left lung; effusion in the right pleural cavity. Liver normal; spleen three times its natural size. Bowels somewhat congested, solitary glands disorganized and rectum inflamed.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

Case 20.—Private Thomas McGee, Co. F, 1st Ala. (refugee); age 28; admitted Feb. 23, 1865, with pneumonia of lower lobe of right lung. Incessant vomiting of bilious matters, amounting to six or eight pints daily; tongue moist and clean; pulse feeble and rapid; some cough; slight expectoration. Gave opiates and diaphoretics; applied oiled-silk jacket. 24th: Pulse weaker; still vomiting; hiccough. 25th: Pulse feeble, very rapid; no cough or expectoration. Gave whiskey, beef-tea and carbonate of ammonia. 26th: Tongue moist. Gave tincture of iron. 28th: Pulse almost imperceptible; still vomiting. March 1: Pulse stronger. 3d: Pulse 96, of fair strength; tongue clean; entire right lung affected. 6th: Pulse 110. 7th: Pulse 130 and feeble; no pain; pneumonia in lower part of left lung. 8th: Died at noon. *Post-mortem* examination: Right lung hepatized throughout; lower edge of left solidified; two pints of serum and much recent lymph in pleuræ. Other organs healthy.—*Douglas Hospital, Washington, D. C.*

Case 21.—Private Samuel E. Oakes, Co. E, 13th Mich.; age 36; admitted May 23, 1865, much oppressed; pulse strong, bounding; severe dyspnœa; sputa tough, tenacious. Died 28th. *Post-mortem* examination: Pleuræ adherent, containing twelve ounces of serum; lungs hepatized.—*Slough Hospital, Alexandria, Va.*

Case 22.—Private Thomas H. Mitchell, Co. G, 16th N. Y. Cav.; age 45; admitted Nov. 20, 1864, with scurvy, which yielded to the usual treatment. On March 28, 1865, he had chills followed by pain in the chest with cough. Died April 6. *Post-mortem* examination: Upper and middle lobes of right lung largely adherent, solid, gray, granular and friable; lower lobe crepitant, slightly injected. Lower lobe of left lung brownish-red, its bronchial tubes dark and thickened. Liver cirrhosed; spleen soft, full of blood; kidneys pale.—*Third Division Hospital, Alexandria, Va.*

Five cases of laryngeal complications.

CASE 23.—Private William Jones, Co. K, 6th N. Y. Cav.; age 19; admitted April 25, 1865; very feeble; pulse 110; tongue coated with whitish fur; little appetite; breathing hurried and difficult; sore throat; aphonia. 29th: Decidedly typhoid condition; tongue dry and swollen; teeth covered with sordes. Died May 11. *Post-mortem* examination: Body much emaciated. Larynx inflamed and thickened; vocal chords destroyed; mucous membrane of trachea inflamed, roughened and thickened; lungs hepatized and infiltrated with pus except lower lobe of left lung, which was healthy.—*Cumberland Hospital, Md.*

CASE 24.—Serg't John Brunskill, Co. I, 99th Pa.; age 50; admitted Nov. 23, 1863. Died 27th. *Post-mortem* examination: The brain was healthy. The pharynx was dark-purple; the œsophagus of a white color above, stone-blue mixed with ochre color below. The epiglottis was not thickened but highly injected, especially at its free edge; at the central basil portion was a darkened spot about the size of a pea. The vocal chords were ulcerated posteriorly, the ulcers linear, with high, roundish, pale walls and the mucous membrane around of a dark-purplish color. The sides of the larynx, below this point, were of a stone-blue color and considerably injected. The trachea was intensely purple but not thickened. The bronchial glands were large and blackened. The first and second lobes of the right lung were slightly engorged, the third lobe splenified; weight of lung thirty-five ounces. The left lung was hepatized gray; its central portion was of a darker hue than the rest of the tissue and appeared to be in the last stage of red hepatization; weight seventy-five ounces. The heart contained venous clots on both sides. The liver was healthy but weighed ninety-five ounces; the gall-bladder was empty; the spleen, dark and pultaceous, weighed ten ounces; the pancreas, firm and whitish, four ounces; the kidneys were intensely congested.—*Ass't Surgeon Harrison Allen, U. S. A., Lincoln General Hospital, Washington, D. C.*

CASE 25.—Private James Simonds, Co. A, 3d N. H.; age 39; admitted Feb. 2, 1865, with pneumonia of left lung. Laryngeal inflammation set in with œdema, necessitating laryngotomy. Died 7th. *Post-mortem* examination: Heart-clots in all the cavities. Left lung hepatized, fifty-eight ounces; pleural sac inflamed throughout. Glottis occluded, larynx and trachea reddened.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

CASE 26.—Private William E. Abels, Co. G, 9th N. Y. Art.; age 21; admitted July 10, 1864, very weak. Died suddenly by asphyxia next day. *Post-mortem* examination: Vessels of brain injected. Epiglottis and its folds much swollen; mucous membrane of larynx and trachea bright-red; no ulcers or false membrane. Right lung nineteen ounces; upper lobe and posterior portion of lower lobe much congested, dark-purple, on section like blackberry jelly; left lung, eighteen ounces, much congested. Heart nine ounces and a half; semilunar valves and lining of aorta and pulmonary artery bright pink. Liver, fifty-four ounces, very soft, acini scarcely perceptible, external surface quite dark, capsule of Glisson easily separated.—*Lincoln Hospital, Washington, D. C.*

CASE 27.—Private John Waldron, 29th Mass. Batt'y; admitted and died Feb. 24, 1865. On the preceding day this man had become intoxicated, and was found at night lying in the rain near Fort Bennett. *Post-mortem* examination: Glottis and larynx inflamed. Right lung adherent and hepatized; left adherent, lower lobe hepatized and presenting a tubercular deposit three-quarters of an inch in diameter, with the tissue around it indurated and slightly inflamed. Heart normal. Liver adherent to diaphragm, substance normal; spleen normal; right kidney congested. Stomach in its pyloric half covered with brownish patches; duodenum similarly affected; jejunum, ileum and large intestine normal.—*Hospital, Fort Strong, Va.*

Two cases in patients affected with delirium tremens.

CASE 28.—Private John Maquilla, Co. C, 11th Md., reported to have died of delirium tremens. *Post-mortem* examination: Serum in arachnoidal sac and below visceral layer, also in lateral ventricles; softening of fornix, congestion of corpora striata. Communicating channel between auricles large enough to admit little finger; fibrinous clots extending into vessels. Posterior portion of left lung dark-colored and containing solidified nodulations, weight forty-four ounces; adhesions on right side and eight ounces of serum in sac; lung hepatized, seventy-seven ounces. Spleen pulpy; kidneys congested.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

CASE 29.—Private Patrick Hennessy, Co. E, 1st Md. Inf.; age 25; admitted Sept. 11, 1865; died next day. He had been on a debauch for eight or ten days, during which time he had not taken food. *Post-mortem* examination: Congestion of pia mater; opacity of arachnoid; two ounces of liquid in sac and as much in lateral ventricles. Right lung dark-purple, but crepitant, except under pleuritic bands on sides and summit, weight thirty-two ounces; left lung engorged, dark-red, weight thirty-one ounces. Fibrinous clots in heart. Spleen enlarged, dark-red and pulpy. Stomach diffused red in fundus, with marbling of a darker hue; duodenum and jejunum hyperæmic.—*Ass't Surgeon Geo. M. McGill, U. S. A., Hicks Hospital, Baltimore, Md.*

One case in which cerebral lesions were not associated with recognized cerebral symptoms.

CASE 30.—Private Alfred E. French, Co. K, 5th Vt.; age 21; admitted Aug. 10, 1862, suffering from chronic diarrhœa contracted on the Chickahominy. By October 1 the diarrhœa was in a measure checked, recurring only at intervals, when some imprudence had been committed, and even then it was not excessive and was easily checked by astringents. There was at all times a great deal of gastric irritability and tendency to dyspepsia, which was benefited and at times wholly relieved by subnitrate of bismuth in five-grain doses three times daily, but the stomach would at no time retain large quantities of strong food. The patient appeared to gain strength and was, as soon as able, required to take exercise every day in the open air. This state of things continued until Feb. 8, 1863, when he complained of pain over the middle portion of the right lung, which in a short time developed into well-marked pneumonia, for which stimulants were administered and warm fomentations applied to the chest; diaphoretics, also, were

freely employed but all to no effect, the patient continuing to grow worse until death on the 18th. *Post-mortem* examination confirmed the diagnosis and brought to light other things which had not been indicated by the symptoms: There was great effusion into the substance of the brain; the arachnoid was opaque, and other phenomena present, such as purulent patches over the surface of the brain, gave evidence of the existence of a violent arachnitis No symptom during illness indicated cerebral trouble unless the irritability of the stomach could be attributed to pneumogastric disturbance. The patient never complained of headache or dizziness; was perfectly natural up to the time of his death, which was about ten days from the date of the pneumonic attack. The whole intestinal surface showed signs of inflammation and there was a deposit of black pigment in the solitary and agminated glands. The liver, spleen and pancreas were healthy. The thoracic viscera were mostly healthy except the right lung, which was the seat of the pneumonia; there were also pleuritic adhesions on both sides.—*Satterlee Hospital, Philadelphia, Pa.*

Three cases unmarked by characteristic pneumonic symptoms.

CASE 31.—Private George Brown, Co. E, 1st Me. Cav.; age 24; was admitted from the Army of the Potomac Aug. 9, 1864. The patient was scarcely able to raise himself in bed. His skin was covered with perspiration and sudamina, which in some places were on inflamed bases. He had diarrhœa, cough and pain in the chest, but the chest symptoms were not of much severity. He lay upon either side without inconvenience, breathed regularly though rather slowly, and complained of distress only in the bowels. Astringents, opiates and stimulants, with counter-irritation, were employed. He rallied for a day or two, but again grew worse, and died on the 25th. *Post-mortem* examination: The left lung was hepatized, a portion of it being in the gray stage; the right lung was nearly healthy. The small intestine was inflamed but not ulcerated.—*Third Division Hospital, Alexandria, Va.*

CASE 32.—Corporal Milan Drake, Co. B, 22d Mich.; age 33; was admitted April 16, 1864. A severe chill on the morning of admission was followed by high fever and delirium; the pulse was 100, strong and full, the tongue covered with a yellowish coat and the eyes injected. The bowels were moved freely by cathartic pills after which the tongue became less coated, but otherwise the patient's condition remained unchanged until the morning of the 19th, when, having rested well during the previous night, his skin was found to be moist, pulse 104, tongue moist and brown, bowels regular and appetite returning; there was a purulent discharge from the eyes. On the 20th pneumonia was recognized on the right side and a blister was applied. Next day the breathing became more hurried, the tongue dry and brown, the pulse small and weak and the eyes continued inflamed. Turpentine emulsion and wine were prescribed; but he died on this day. *Post-mortem* examination: There was some serous effusion beneath the arachnoid, but the brain-substance was normal. The right lung was adherent; its upper lobe was hepatized gray, its middle lobe red, its lower lobe congested; the mucous membrane of the bronchial tubes was much injected and thickened. The other viscera were normal.—*Act. Ass't Surgeon L. C. Cook, Hospital, Chattanooga, Tenn.*

CASE 33.—James Sutton, substitute, unassigned; age 20; was admitted April 9, 1865. The prominent symptom was headache, for the relief of which ten grains of blue-pill, with castor oil to follow, were prescribed. During the night the bowels were freely opened and next day the headache was relieved; but the patient complained of uneasiness or slight pain in the right side, where was some dulness on percussion, with coarse crepitation over the lower and posterior part of the right lung. There was but little cough and no expectoration; pulse 100, rather small and compressible. Quinine, stimulants and nutrients were freely administered, but without effect; the patient died towards evening. *Post-mortem* examination: The lower lobe of the right lung and the lower part of its upper lobe were hepatized; the left lung was congested throughout. The spleen was congested and softened. The other organs were normal.—*Act. Ass't Surgeon Lewis Heard, L'Ouverture Hospital, Alexandria, Va.*

Ten cases of relapse or recurrence.

CASE 34.—Private Milas Houp, Co. K, 3d Ark. Cav.; age 37; had an attack of pneumonia in February, 1864, from which he never entirely recovered. He was taken with chill and severe pain in the head and breast Dec. 9, 1864, and was admitted next day. Tongue coated and red; bowels loose; pulse 120; respiration difficult and hurried; cough with expectoration; pain in breast; dulness over upper lobes of both lungs; sibilant râles on left side. He died on the 22d. *Post-mortem* examination: Great emaciation. Gray hepatization of the left lung; lymph on the pleura and pus and serum in the cavity. Fibrinous clots in the heart. Bowels congested; rectum inflamed and softened; glands disorganized.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

CASE 35.—Private L. Ireland, Co. I, 121st Ohio; age 31; admitted March 3, 1863. This patient had suffered from pneumonia in December, 1862, and was on admission feeble, emaciated, sallow and affected with diarrhœa. On the 17th he was seized with pain in the lower part of the right lung, accompanied with fever, cough and rusty expectoration. He died on the 24th. *Post-mortem* examination: Upper and middle lobes of right lung hepatized gray, lower lobe engorged. Fibrinous clots in right auricle.—*Hospital, Quincy, Ill.*

CASE 36.—Jeremiah M. Clubb; age 50; a farmer of Madison Co., Mo.; was admitted Nov. 28, 1864, with typhoid pneumonia. He had been conscripted in September, but escaped from the rebel army and reported to the United States forces at Rock Island, Ill., November 24. He had not fully recovered from a previous attack of pneumonia, and the unaccustomed exposure attending his escape caused a return of the cough and pain in the breast, which grew worse and seemed to shift from side to side. Dover's powder, camphor, quinine, turpentine emulsion, whiskey and milk diet were used in his treatment, but he continued to grow weaker. On December 13 his countenance assumed a dark-leaden hue and he became very drowsy, falling into a semi-unconscious state on the 15th and dying next day. *Post-mortem* examination: Great emaciation. Hepatization of the lower lobes of both lungs. Mesentery highly

inflamed and glands disorganized. Blood thin and watery—apparent lack of red corpuscles.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

Case 37.—Private Henry H. Maxson, Co. C, 9th Mich.; age 28; was admitted Feb. 26, 1864, with pneumonia,—prognosis favorable, but on March 3 he died, after being suddenly seized with severe pain in the chest, hurried respiration and frequent pulse. The relapse was apparently occasioned by throwing off the bedclothes at night. *Post-mortem* examination: Right lung friable, hepatized red alternated with gray except a narrow border at base, which was healthy; lower lobe of left lung hepatized red. The spleen weighed twenty-eight ounces; the other viscera were healthy.—*Hospital No. 8, Nashville, Tenn.*

Case 38.—Private Nathaniel T. Beck, Co. G, 8th Tenn. Cav.; admitted Jan. 7, 1865. This patient had two attacks of pneumonia and one of typhoid fever since his enlistment in 1861. A third attack of pneumonia was treated in this hospital Oct. 18 to Dec. 29, 1864. He caught cold after his return to barracks, and died from a recurrence of the inflammatory process. *Post-mortem* examination: Great emaciation. Right pleural cavity filled with pus. Liver pale; bowels congested; rectum inflamed.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

Case 39.—Private George Trite, Co. H, 28th Mich.; age 18; admitted Jan. 30, 1865: General febrile excitement: pain and crepitant râles in the right side; respiration hurried, labored; some cough; sputa scanty, white and tenacious. February 4: Fever abated; much cough; sputa copious and less tenacious. 8th: Worse, probably from exposure to draft of cold air; quite delirious; high fever; much cough; rusty sputa; dulness over lower lobe, absence of vocal resonance. Died 12th. *Post-mortem* examination: Right lower lobe hepatized; pleura contained more than a pint of serum. Other viscera normal.—*Third Division Hospital, Alexandria, Va.*

Case 40.—Private Z. T. Buckingham, Co. K, 10th E. Tenn. Cav., was admitted Jan. 24, 1864, with diarrhœa. He contracted pneumonia February 5, and on the 17th, while convalescing, a relapse took place from exposure; he died on the 20th. *Post-mortem* examination: Body well nourished. The membranes of the brain were injected. There were pleuritic adhesions on the right side; the lower lobe of the right lung was hepatized, the upper lobe engorged; the lower lobe of the left lung was slightly engorged; the bronchial tubes also were inflamed; the lungs weighed fifty-one ounces. The heart, peritoneum and stomach were healthy; the lower portion of the small intestine was slightly inflamed; the large intestine inflamed and thickened but not ulcerated. The liver weighed seventy-six ounces and was softer than natural; the spleen ten ounces. Only one kidney was found; it was on the left side and weighed ten ounces and a half.—*Act. Ass't Surgeon J. E. Marsh, Hospital No. 19, Nashville, Tenn.*

Case 41.—Private George P. Wade, Co. A, 48th Ia.; age 25; admitted March 25, 1864, convalescent from pneumonia. April 6: Severe vomiting of bilious matter, which recurred at intervals; little pain in chest, but at times a paroxysm of coughing of ten minutes' duration. Died 16th. *Post-mortem* examination: Right lung hepatized throughout; firm but recent pleuritic adhesions; left lung, upper lobe hepatized, lower somewhat emphysematous.—*Hospital No. 8, Nashville, Tenn.*

Case 42.—Thomas Watkins, Co. E, 8th Iowa Cav.; age 20; admitted Feb. 17, 1864. In November, 1863, after exposure, he had a chill, followed by fever and cough with bloody expectoration. On admission his symptoms were pain in the chest, dulness, especially on the axillary line and posteriorly on the left side and anteriorly below the nipple on the right; fine râles in the left lung, more natural sounds in the right lung; expectoration tenacious, scanty and streaked with blood; respiration frequent and short; appetite poor; pulse small, rapid and weak. Died March 11. *Post-mortem* examination: Lower lobe of right lung hepatized red and covered with old and strong adhesions; left lung hepatized red with spots of gray; pleural cavity contained eight ounces of purulent liquid. Heart normal.—*Hospital No. 8, Nashville, Tenn.*

Case 43.—Private E. A. Chamberlain, 3d Vt.; age 27; admitted Feb. 28, 1864, with pneumonia. He was improving under treatment when, on March 15, he was seized with vomiting, fever and cough, with blood-tinged sputa. He died on the 23d. *Post-mortem* examination: Left lung hepatized throughout except anterior margin of upper lobe; lower part of right lower lobe impervious, much of the remainder congested; but little pleuritic effusion; pleura in several places much inflamed, especially near the pericardium. Several ounces of limpid serum in the pericardial sac. Liver cirrhosed, atrophied, dense, mammillated, puckered.—*Third Division Hospital, Alexandria, Va.*

Six cases suggestive of malarial complications.

Case 44.—John B. Crofton, rebel prisoner; admitted Oct. 13, 1864. Died 20th. *Post-mortem* examination: The left lung was hepatized and infiltrated with pus. The heart contained a thrombus. The liver was congested to twice its normal size, the spleen to five times its normal size; the pancreas was enlarged; the kidneys healthy; the small intestine was congested.—*Act. Ass't Surgeon H. H. Russell, Rock Island Hospital, Ill.*

Case 45.—Jno. W. Whigham, Government employé, age 34; admitted March 26, 1864, with pneumonia. Died 30th. *Post-mortem* examination: Left bronchial tubes much inflamed; right lung, upper lobes hepatized gray, lower lobe much inflamed. Heart filled with firm black clots. Liver ninety-three ounces; spleen twenty-one ounces, dark; right kidney ten ounces, left eleven ounces. Intestines normal.—*Hospital No. 1, Nashville, Tenn.*

Case 46.—Private John W. Tipton, Co. E, 15th Ohio; age 18; admitted Feb. 27, 1864; had been sick for some days but could not tell how long. Sordes on teeth and gums; tongue dry and black; pulse 130. Died March 5. *Post-mortem* examination: Right lung thoroughly congested, upper lobe hepatized red; left lung congested throughout. Spleen weighed twenty-four ounces; other viscera normal.—*Hospital No. 8, Nashville, Tenn.*

Case 47.—Private Samuel Crawford, Co. G, 2d La. Cav.; age 20; was admitted Jan. 7, 1864, with severe cutting pains in the right side, difficulty in breathing and violent cough attended with a brown mucous expectoration; his

face was flushed and pulse 120. Calomel and opium, and afterwards chloride of ammonium, were used, with sinapisms and belladonna externally. The patient died on the 14th. Prior to this fatal seizure he had suffered from severe attacks of intermittent fever. *Post-mortem* examination: The right lung was hepatized red and partly adherent to the costal and diaphragmatic pleuræ; the left lung was normal. The liver weighed four pounds and a half, the spleen two and a half pounds.—*Act. Ass't Surgeon H. Urban, University Hospital, New Orleans, La.*

Case 48.—John Fowler; age 20; citizen of Carter Co. Mo., subject to ague for several years; admitted Jan. 26, 1865, with pneumonia and jaundice which dated from the 12th. Skin very yellow; urine highly colored; bowels normal; tongue coated; pulse 120, quick and sharp; respiration somewhat hurried and labored; cough, with expectoration of mucus tinged with bile. Died 31st. *Post-mortem* examination: Skin jaundiced. Gray hepatization of the posterior portion of both lungs, involving two-thirds of their extent; effusion into pleural cavities. Large thrombi in right side of heart, extending into and filling the pulmonary arteries. Liver rather paler than usual; gall-bladder distended with transparent gelatinous liquid; spleen about three times the normal size; bowels normal.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

Case 49.—Private William Taylor, E. Tenn. Cav., unassigned; age 23; admitted Feb. 1, 1864, from the field. Died 6th. *Post-mortem* examination: Extensive recent pleuritic adhesions on left side with heavy deposits of lymph; left lung throughout entering gray hepatization. Extensive firm pleuritic adhesions of right side; lower lobe of lung hepatized red, middle and upper lobes much congested. Heart contained large recent buff clots. Liver, ninety-eight ounces, congested, fatty and adhering to diaphragm; spleen, twenty ounces, pulpy; kidneys, eight ounces each, healthy. Stomach and intestines healthy.—*Hospital No. 1, Nashville, Tenn.*

*Six cases suggestive of the poison of typhoid fever.**

Case 50.—Serg't C. W. Breese, Co. C, 141st N. Y.; age 30; was admitted July 29, 1863, having been taken sick about three weeks before with pneumonia of both lungs and diarrhœa. He was treated with stimulants and beef-essence, turpentine stupes, opium, catechu and opiate enemata. He died August 2. *Post-mortem* examination: The lower lobe of each lung was hepatized and the glands of Peyer ulcerated. The other organs were healthy.—*Stanton Hospital, Washington, D. C.*

Case 51.—Private John B. Pope, Co. A, 2d N. J. Cav.; admitted Jan. 2, 1863, with pneumonia. Died 27th. *Post-mortem* examination: Emaciation. Right lung, twenty-three ounces, carnified posteriorly and inferiorly in lower lobe, reddish-purple and containing melanic matter; pus in bronchial tubes. Left lung twenty-one ounces, lower lobe carnified and containing melanic matter; pus issued on section from what appeared to be dilatations of the bronchial tubes; bronchial glands black. Heart pale, flabby and with fibrinous clots in all its cavities. Liver, sixty-five ounces, full of blood; spleen, nine ounces, pulpy. Ileum thinned, congested and with some ulceration of Peyer's patches; large intestine thinned and congested. Kidneys pale and showing lines of congestion in the cortical substance.—*Lincoln Hospital, Washington, D. C.*

Case 52.—Private Nelson Cochran, Co. F, 44th Colored Troops; age 17; was admitted July 26, 1864, and died September 10. *Post-mortem* examination: Lower lobe of each lung hepatized; upper lobe of right lung hepatized gray. Heart pale and flabby. Liver, spleen and kidneys normal; mucous membrane of intestines congested and softened, and ulcerated in the ileum and large intestine.—*Chattanooga Field Hospital, Tenn.*

Case 53.—Private Samuel Gordon, Co. H, 13th W. Va.; age 37; was admitted March 8, 1865, with pneumonia. His pulse was 104, tongue dry and fissured, skin hot and dry, face flushed; he complained of a dull pain in the chest and had a cough with scanty sputa tinged with blood. He was treated with an expectorant mixture containing one-fourth of a grain of tartar emetic in each dose, given every four hours. He died on the 15th. *Post-mortem* examination: The upper lobe of the right lung was hepatized and bound to the thoracic parietes by slight recent adhesions; the upper lobe of the left lung was also adherent, the lower lobe partially hepatized. The liver was pale, large and soft; the spleen much enlarged; the small intestine inflamed and in portions almost gangrenous.—*Act. Ass't Surgeon Thomas R. Clement, Cumberland Hospital, Md.*

Case 54.—Private George J. Warren, Co. G, 123d Ohio; age 20; admitted Oct. 14, 1863. Auscultation indicated abscess of lung; expectoration muco-purulent; tongue red, dry and smooth; anorexia; prostration. He gradually failed, and died Jan. 4, 1864. *Post-mortem* examination: Extensive pleuritic adhesions; lungs filled with purulent fluid; a portion of upper and middle lobes of right lung pervious to air. Intestines showing signs of former inflammation, with occasional small ulcers in the lower ileum.—*Cumberland Hospital, Md.*

Case 55.—William H. Jones, unassigned substitute; admitted Oct. 6, 1863, with typhoid pneumonia. He had some looseness of the bowels, great dyspnœa and cough with rusty sputa; tongue brown and parched, skin hot and dry; he was much prostrated, had slight subsultus and at night delirium. He died comatose on the 8th. *Post-mortem* examination: Right lung and lower lobe of left in a state of complete splenization; pleuritic adhesions on the right side; no effusion. Eight ounces of serum in pericardium; heart flabby and atrophied. Spleen and lower portion of gastro-colic omentum congested; lower part of ileum and descending colon ulcerated and containing pus; kidneys and bladder normal.—*Act. Ass't Surgeon W. Leon Hammond, 1st Division Hospital, Alexandria, Va*

Five cases of enlargement of the solitary follicles.

Case 56.—James Hunter, Missouri guerilla; age 25; admitted Nov. 24, 1864, with typhoid pneumonia which lasted ten days. Pulse 120; respiration hurried; pain in side; expectoration scanty and tinged with blood; counte-

* See also the *post-mortem* records of the continued fevers, *supra*, page 412.

nance anxious; dulness on percussion and crepitant sounds over right lung; bowels tympanitic and tender. Died December 1. *Post-mortem* examination: Gray hepatization of right lung and lower lobe of left. Distention of bowels with gas and enlargement and disorganization of solitary glands. Other viscera normal.—*Rock Island Hospital, Ill.*

Case 57.—Private Henry S. Rikard, Co. G, 36th Ala. Typhoid pneumonia. Admitted Nov. 22, 1864; died 26th. *Post-mortem* examination: Gray hepatization of the right lung and of the lower lobe of the left. The heart contained a large thrombus, which extended into the pulmonary artery and was the probable cause of death. The intestines were congested and ulcerated, the solitary glands enlarged and resembling polypi. The blood presented a disorganized and broken-down appearance.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

Case 58.—Private Daniel Bivins, Co. C, 133d N. Y.; age 25; admitted April 11, 1865. Restless; irrational; pulse rapid and feeble; tongue dry and brown; breathing difficult; dulness, crepitus and friction over lower lobe of right lung; diarrhœa; involuntary passages. He died on the 15th. *Post-mortem* examination: Pia mater congested, lining of ventricles injected, fornix softened. Old costal and interlobar adhesions on right side; congestion and solidification in spots in both lungs, especially posteriorly. Fibrinous clots in heart. Nutmeg liver. Mucous membrane of ileum thinned and softened and solitary glands enlarged.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Case 59.—Francis Robinson, of Asheville, N. C.; rebel deserter; admitted Feb. 11, 1863. Pulse 120, thready; tongue dark and cracked; pungent odor of typhoid condition; left lung solidified; signs of pleural implication. Died 18th, after being unconscious for nearly two days. *Post-mortem* examination: Liquid in arachnoid and a little in lateral ventricles. Eighteen ounces of serum in left pleural sac; lung fifteen ounces, its lower lobe adherent, solid, mottled red and gray, granular and yielding a bloody serum on pressure; right lung normal but some serous liquid in pleural sac. Mixed clots in cavities of heart. Some spots of congestion; enlarged solitary glands and local thinning of intestinal mucous membrane. Spleen pulpy.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Case 60.—John L. Bridges; age 30; Missouri guerilla; admitted Dec. 4, 1864, with typhoid pneumonia which had lasted a week. Tongue dry, brown and narrow, with red margins; bowels rather loose; pulse 120, full; respiration hurried; cough with copious expectoration; pain in side; dulness over base of right lung and crepitant râles generally diffused. He became delirious on the 13th, and died next morning. *Post-mortem* examination: Great emaciation. Serum and pus in right pleural cavity, with collapse, softening and impermeability of the lung. Thrombi in both auricles. Congestion of the liver and bowels with enlargement of the mesenteric glands and disorganization of the solitary follicles.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

Seven cases of marked typhoid symptoms unconnected with an enteric lesion.

Case 61.—Private Griffin Canterberry, Co. G, 3d W. Va.; age 55; was admitted April 4, 1865, with typhoid fever. The patient was emaciated and delirious; he had considerable cough and crepitant râles were audible over the lower third of the right lung; his tongue was moist. Tonics and stimulants were freely administered. He died on the 9th. *Post-mortem* examination: The lower lobe of the right lung was hepatized. The liver was slightly congested; the gall-bladder distended with healthy-looking bile; the spleen large and soft; the kidneys congested and softened and one of the pyramids of the left kidney converted into a cyst. The bowels were much distended with gas.—*Ass't Surgeon David Shanor, 6th W. Va. Vols., Cumberland Hospital, Md.*

Case 62.—Private John Shay, Co. G, 16th N. Y. Cav.; age 35; while in hospital under treatment for chronic rheumatism was attacked, May 2, 1865, with pneumonia. Typhoid symptoms appeared on the 11th, and death took place on the 14th. *Post-mortem* examination: Left lung, except a small portion at the base, solidified, of a dirty-gray color, firm and fatty; right lung congested. Other viscera normal.—*Augur Hospital, Alexandria, Va.*

Case 63.—Tobias Gibbons; paroled rebel prisoner; age 45; admitted May 6, 1865, in a state of great prostration; pulse 100, feeble; respiration normal; no pain or cough; eyes heavy and expressionless; tenderness over abdomen, more intense in right iliac fossa; dulness over greater portion of both lungs; bronchial respiration and crepitus. Died 10th, without having been thoroughly conscious from the time of his admission. *Post-mortem* examination: Brain normal. Right lung, fifty-six ounces, congested in upper and puruloid in lower parts; left lung, twenty-nine ounces, intensely congested posteriorly. Fibrinous clots in heart. Liver congested. No lesion observed in small intestine.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Case 64.—Hospital Steward Benjamin V. Stone, 28th Mich.; age 28; was admitted Feb. 14, 1865, with pneumonia. The patient, of a nervous temperament, was considerably depressed and seemed to be laboring under mental anxiety. He said he had been subject to tertian intermittent fever and diarrhœa, for which he had taken opium and quinine in large quantities. He was not much emaciated, but his pulse was weak and he had no appetite; a slight crepitus was detected in the lower lobes of the lungs; he had headache and some deafness on both sides. He continued to grow weaker and more depressed in mind, so that by the 20th he could not leave his bed. The diarrhœa yielded readily, but the deafness increased; the pulse became thready and rose to 140; restlessness was followed by delirium, during which the patient wanted to sit up or kept picking at the bedclothes. He became drowsy on the 28th, but continued picking at the bedclothes until the coma deepened. He died March 3. *Post-mortem* examination: The cerebral membranes were opaque and serum was effused beneath them; the brain was quite hard and rather pale; the choroid plexus pale, almost white near the foramen of Monro; the spinal cord was pale. The pericardium contained clear serum. The upper lobe of the right lung was soft, hepatized gray behind and crepitant only in its anterior edge; its bronchial tubes were full of pus; the lower lobe was brown in color and sank in water; its tubes

were dark-purple and thickened. A patch of strong adhesion was found on the external surface of the left lung, the upper lobe of which was crepitant but softened and presented a little cicatrix at the posterior part of its apex; the lower lobe was softened and spotted with blackish or brownish-red patches in a gray or pinkish-gray crepitant tissue; the bronchial tubes, dark-purple in color, were filled with pus. The liver was soft, pale-yellow and of good size; the spleen soft and small. The ileum was full of air and slightly injected, but otherwise normal. The kidneys were fatty and injected with dark blood.—*Third Division Hospital, Alexandria, Va.*

Case 65.—Private George E. Blackmer, Co. C, 3d Mass.; age 20; taken sick Feb. 16, 1862, with diarrhœa, and admitted March 2. Diagnosis: Typhoid fever. 4th: Drowsy; cheeks flushed; pulse full, weak and rapid; skin hot and dry; some deafness; tongue coated; much thirst; two watery stools daily; much cough with mucous expectoration. Gave stimulants, iron and turpentine emulsion. 6th: Tongue moist; no abdominal tenderness; cough lessened; appetite returning; bowels regular. He continued thus until the 10th, when the record shows some delirium at night, epistaxis and dry tongue. In answering questions he confused his dreams with realities, and for some days afterward had curious hallucinations. His appetite continued good and his bowels regular, but the pulse remained quick and weak. On the 16th his cheeks became much flushed; he had severe pain in the right breast and was unable to breathe deeply, to cough or to lie down. 17th: Replies rationally, but at once relapses into delirium; pulse rapid, soft; skin natural; tongue moist, slightly coated; appetite poor; bowels regular; some deafness; much epigastric tenderness and severe pain in chest. Applied fly-blister over summit of right lung. He gradually failed, and died on the 25th. *Post-mortem* examination: Extensive pleuritic adhesions on left side; slight adhesions on right side, with thin layers of coagulable lymph and thirty ounces of effusion; hepatization and purulent infiltration of right lung and a portion of the lower lobe, two inches square, choked with coagulated blood; bronchial tubes of both lungs filled with frothy mucus.—*Seminary Hospital, Georgetown, D. C.*

Case 66.—Private Thomas Warner, Co. K, 15th Va.; age 28; admitted Nov. 20, 1864, with typhoid fever. Died 26th. *Post-mortem* examination: The posterior two-thirds of both lungs were hepatized and the remaining parts congested. The left pleura and the pericardium contained effused liquid. The heart was flabby, the liver large, the spleen hypertrophied and soft. The other organs were normal.—*Act. Ass't Surg. B. B. Miles, Jarvis Hospital, Baltimore, Md.*

Case 67.—Private Jackson Freeman, 1st Mich. Colored troops; age 19; was admitted March 17, 1865, with pneumonia. His pulse was 100, skin hot, tongue furred; he had severe cough with viscid sputa, crepitus on the right side of the chest and bronchial respiration on both sides. Stimulants, expectorants, Dover's powder and poultices were prescribed. On the 19th crepitation was heard on both sides. The tongue on the 24th became dry and brown in the centre, red and moist on the edges; sordes appeared on the teeth and there was considerable abdominal tenderness. He died April 17. *Post-mortem* examination: The greater part of the right lung was adherent and in a state of red hepatization—in places commencing to soften; the right pleural sac contained sixteen ounces of serum mixed with pus; the left lung was congested. The pericardium contained four ounces of serum. A number of lumbricoid worms were found in the ileum. The kidneys were congested and soft.—*Act. Ass't Surgeon S. D. Twining, L'Ouverture Hospital, Alexandria, Va.*

Two cases showing the maximum weight of the consolidated lung in the series of two hundred and thirteen cases.

Case 68.—Private William Barker, Co. I, 123d Ind.; age 43; admitted Feb. 4, 1865: Distressing dyspnœa; large crepitation on right side of chest superiorly and but little sound at all inferiorly, with dulness over all; puerile respiration, with slight resonance on left side. Died 10th. *Post-mortem* examination: Universal adhesion of lungs; right lung seventy-three ounces, its upper and lower lobes completely hepatized, middle lobe unaffected; left lung congested; bronchial glands enlarged. Other organs healthy.—*Douglas Hospital, Washington, D. C.*

Case 69.—Tolland Ephraim Couso, rebel soldier; age 26; admitted Jan. 27, 1864, with pneumonia. Died 31st. *Post-mortem* examination: Much emaciation; left leg and thigh largely œdematous; left femoral vein distended with clotted blood and left common iliac vein obstructed by a strong fibrinous clot three inches long. Firm adhesions posteriorly and at the base of left lung, with a pint of serum in the sac; lung completely hepatized gray; weight ninety-two and a quarter ounces. Firm adhesions posteriorly and at the base of right lung, middle and lower lobes posteriorly hepatized red; weight twenty-seven ounces. Heart contained large dark clots in each side. Liver, seventy-three ounces, fatty; spleen, ten ounces, light-colored, mottled with several dark spots; kidneys healthy.—*Hospital No. 1, Nashville, Tenn.*

Besides the 213 cases illustrated by the selections just submitted, the records furnish 87 cases of pneumonia characterized by peculiarities in their complications or results.

Twenty-seven of these were associated with pericarditis.

Case 70.—Private Charles Chadburne, Co. A, 11th U. S. Inf.; age 22; admitted Aug. 10, 1862, with debility. Died Feb. 4, 1863. *Post-mortem* examination: Body emaciated. The surface of the heart was roughened with recent pseudomembrane and the inner surface of the pericardial sac was injected and partially roughened, but there was no adhesion; the sac contained about half a gill of serum. The right lung was collapsed to about the size of two fists and was in a condition of complete pneumonic hepatization; the pleural cavity was lined with a thick and roughened pyogenic membrane and contained about a gallon and a half of pus. The left lung, with the exception of bronchial inflammation and slight congestion, was healthy. The liver was flattened above from the purulent accumulation in the thorax, and purplish-red and darkly-spotted from engorgement of the central vessels of the

lobuli; the spleen was rather soft and Indian-red on section. The stomach and intestines generally were healthy excepting some moderately and recently inflamed patches and streaks in the ileum and colon; the intestinal glands were healthy. The kidneys, though seeming somewhat fatty to the naked eye, appeared normal on microscopical examination.—*Act. Ass't Surgeon J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 71.—Private James D. Pettis, Co. E, 114th N. Y.; age 22; was admitted Aug. 27, 1864, with typhoid pneumonia. This man was taken sick on the 8th with a chill, followed by fever and vomiting which continued twenty-four hours. On the 12th he began to suffer from pain in the bowels and in the left side of the chest. On admission there was dulness with crepitant râles over the whole of the left lung except its apex; the cheeks were flushed, the respiration 30, the pulse 120 and soft and the tongue red at the tip and covered with a white fur; he had diarrhœa, and pain in the left side and shoulder. A blister was applied to the side, and catechu, paregoric and wine were prescribed. He improved under treatment, the bowels becoming quiet, the skin cool, the pain diminished and the respiration lessened in frequency; but the tongue continued red at the tip, and on September 5 a sore began to form on his back. On the 11th the patient was much better; his appetite and spirits excellent,—but when about to take supper he was suddenly seized with violent pain in the right side, retching, oppressed respiration and feeble pulse. Next day his extremities became cold and his skin assumed an icteric hue. He died on the morning of the 13th. *Post-mortem* examination: The left lung was solidified except at its apex and the pleural sac contained two quarts of pus; the right lung was congested and coated with lymph and the sac contained ten ounces of serum. The pericardium was distended with serum containing a slight admixture of pus and was lined with a thick coating of lymph; a similar coating covered the heart, which was enlarged. [*Specimen* 441, Med. Sec., Army Medical Museum.] The liver also was considerably enlarged.—*Ass't Surgeon C. Bacon, jr., U. S. A., Annapolis Junction, Md.*

Case 72.—Serg't P. T. Bentley, Co. M, 1st Mich. Cav.; age 23; was admitted Oct. 29, 1864, with fever, cough, pain in the chest, hurried respiration and rusty sputa. A cathartic was administered, followed by small doses of tartar emetic and afterwards by calomel, opium and ipecacuanha; a blister was applied to the chest. He appeared to improve until November 9, when he had a chill followed by a renewal of all the symptoms. He again improved apparently until the 20th, when extreme dyspnœa set in and he sank rapidly, dying on the 22d. *Post-mortem* examination: The right lung was connected with the thoracic parietes by thick layers of lymph in which serum was sacculated; the left was coated with reticulated lymph and compressed against the mediastinum by an accumulation of pale serum. The heart adhered to the pericardium, the apex only being free. [*Specimen* 454, Med. Sec., Army Medical Museum.] The liver presented the nutmeg appearance; the spleen was large and its trabeculæ distinct; the mesenteric glands enlarged. The remaining viscera were normal.—*Act. Ass't Surgeon W. C. Minor, Third Division Hospital, Alexandria, Va.*

Case 73.—Private Aquilla Merrifield, Co. F, 27th Mass., was admitted Dec. 7, 1862. His history and condition are not stated; but his treatment consisted in the administration of veratrum viride and afterwards chalk and mercury, with Dover's powder, quinine and the application of a blister. He died on the 15th. *Post-mortem* examination: The brain was healthy. The lungs were more or less hepatized and covered with recent lymph. The pericardium contained four ounces of yellow serum, and the heart was completely enveloped in a thick deposit of lymph one-sixteenth of an inch in thickness; both surfaces of the membrane were much injected. There were old hepatic adhesions and recent lymph on the intestinal convolutions.—*Surgeon B. Darrach, U. S. Vols., Benton Barracks, Mo.*

Case 74.—Isaac Thacker, Government employé, was admitted Feb. 20, 1864, and died the same evening. *Post-mortem* examination: Body well nourished. Brain healthy. There were extensive old pleuritic adhesions; the lungs weighed eighty-four ounces; the right lung was hepatized throughout, the left congested, the bronchi inflamed. The pericardium was distended with ten ounces of turbid serum; the parietal lining of the sac was coated with fibrinous exudate and masses of lymph three and four lines in thickness adhered to its visceral portion.—*Act. Ass't Surgeon S. M. Olden, Hospital No. 19, Nashville, Tenn.*

Case 75.—Private George A. Chedel, Co. G, 16th Vt.; age 38; was admitted April 14, 1863, having been ill two weeks. Pulse 130, very feeble; respiration 28; pain in chest; cough hard and frequent; expectoration of bloody mucus; dulness and absence of auscultatory sounds over right side of chest, front and back, extending as high as the third rib, and puerile respiration in upper part; diminished resonance and crepitation over lower half of left lung. He died on the 17th. *Post-mortem* examination: Right pleura contained three pints, left pleura half a pint, of liquid, with floating lymph-flakes; extensive recent adhesions on both sides; middle and lower lobes of right lung hepatized, upper lobe congested; lower lobe of left lung in first stage of inflammation, upper lobe normal. Pericardium contained half a pint of serum; heart covered with lymph. Stomach congested; mucous membrane of lower ileum injected and softened; spleen enlarged and softened.—*Third Division Hospital, Alexandria, Va.*

Case 76.—Private William Morse, Co. I, 16th Vt.; age 30; admitted April 14, 1863, with pain in left side; cough; urgent dyspnœa; pulse 120 and feeble; respiration 30; dulness over entire right lung and tubular respiration along the posterior border of the scapula; dulness over lower half of left lung, mucous râles over upper half. 23d: Pain in both lungs increased; dyspnœa urgent; diarrhœa with pain in abdomen; copious sanguineo-purulent expectoration; free diaphoresis. Died 26th. *Post-mortem* examination: Right pleura, much thickened with lymph, contained three pints sero-purulent liquid; lung solid, exuding a little pus on pressure. Left pleura contained two pints of sero-purulent liquid; lung in second stage of inflammation. Six ounces of serum, with floating particles of lymph, in pericardium; villous-shaped lymph coating the heart. Liver and spleen somewhat enlarged. Mucous coat of stomach injected, of small intestine reddened and softened.—*Third Division Hospital, Alexandria, Va.*

Case 77.—Serg't Wm. P. Cahoon, Co. E, 19th Ala., a large fleshy man; age 25; was admitted Nov. 28, 1864,

with acute pneumonia. Pulse 130; tongue coated and dark; surface of body bluish; countenance anxious; respiration 32; hands raised above head for ease in breathing; pain in both sides of chest; dulness and suppressed respiratory breathing on right side from apex to base; intercostal spaces full but no bulging; dulness very general on left side also; cough troublesome; expectoration streaked with blood. Died December 4. *Post-mortem* examination: Right lung collapsed and disorganized and pleural cavity filled with serum; left cavity contained about twelve ounces of effusion; lower lobe of lung hepatized, upper highly congested. Pericardium contained eight ounces of serum and was much thickened and roughened; surface of heart roughened and corrugated; endocardium apparently unchanged. Abdominal viscera normal.—*Act. Ass't Surgeon M. Hale, Rock Island Hospital, Ill.*

CASE 78.—Private Gain Q. Robinson, Co. H, 28th Mich.; age 38; admitted Feb. 6, 1865, with much pain; fever of remittent character; excessive dyspnœa; vomiting of bilious matters; face livid; delirious most of the time. Died 14th. *Post-mortem* examination: Sudamina; capillary congestion on neck and breast. Lungs much congested and exuding a bloody liquid on section. Pericardium thickened, containing four drachms and a half of serum; heart of medium size, fatty.—*Third Division Hospital, Alexandria, Va.*

CASE 79.—Private William Simpson, Co. F, 4th Fla.; age 20; admitted Jan. 4, 1864, with pneumonia. Died 21st. *Post-mortem* examination: Moderate emaciation. Strong pleuritic adhesions on both sides; left pleural cavity contained four pints of serum, right two pints of pus. Left lung hepatized red and covered with a thin layer of lymph; lower half of right lung hepatized gray and presenting a vomica lined with a thin layer of disorganized lymph. Pericardium somewhat inflamed and containing about two ounces of serum; heart with large buff clots entangled in the chordæ. Liver, seventy-four ounces, infiltrated with fat; spleen, eighteen ounces, light-colored and pulpy; kidneys healthy, eight ounces each. Mesenteric glands somewhat enlarged; small intestine much inflamed.—*Hospital No. 1, Nashville, Tenn.*

CASE 80.—Private John Guyman, Co. I, 10th Ill.; age 22; admitted March 2, 1864, with pneumonia. Died 9th. *Post-mortem* examination: Recent firm and universal pleuritic adhesions on both sides; lungs coated thickly with lymph; ten ounces of serum in right pleural cavity; upper lobes of both lungs hepatized red, lower lobes deeply congested. Heart contained large clots; pericardium coated internally with recent heavy deposits of lymph. Liver, one hundred and two ounces, fatty; spleen thirty-three ounces; right kidney nine ounces, left ten ounces, fatty. Peyer's patches somewhat thickened.—*Hospital No. 1, Nashville, Tenn.*

CASE 81.—Private George W. Lute, Co. H, 25th Iowa; age 24; admitted Feb. 29, 1864. Died March 26. *Post-mortem* examination: Pleuritic adhesions slight on the left side, firm on right; upper two-thirds of right lung hepatized gray lower third red; left lung intensely congested. Heart weighed ten ounces, slight pericarditis. Liver, seventy ounces, normal; spleen, sixteen ounces, unusually firm. Intestines and kidneys healthy.—*Hospital No. 1, Nashville, Tenn.*

CASE 82.—Edward Lucan, teamster; age 40; admitted March 23, 1864, with pneumonia. Died April 2. *Post-mortem* examination: The right lung, sixty-one ounces, was adherent and hepatized; the left, twenty-four ounces, was collapsed. The heart was covered with a firm layer of lymph an eighth of an inch thick; the endocardium on the right side was inflamed. The liver weighed eighty-five ounces; the spleen nineteen ounces and a half; the kidneys were fatty; the intestines healthy.—*Hospital No. 1, Nashville, Tenn.*

CASE 83.—Thomas Rihl, Government employé; age 40; was admitted April 11, 1864, complaining of pain in his arms, shoulders and legs; his ankles were slightly swollen. A half drachm of nitrate of potassa was given in water every three hours, under which treatment he seemed to improve; but on the evening of the 15th he had a slight chill with pain in the chest and some cough; slight crepitation was heard over the lower part of the right lung. Wet cups were applied and five-grain doses of blue-pill given every four hours. Afterwards a blister was applied and carbonate of ammonia administered. He died on the 23d. *Post-mortem* examination: The posterior part of the upper lobe and the greater part of the lower lobe of the left lung were hepatized, partly red, partly gray. The heart was rather flabby and the pericardium contained a large quantity of serum. The liver was enlarged and had the nutmeg appearance; the spleen was healthy; the right kidney congested.—*Act. Ass't Surgeon L. A. Walton, Hospital No. 8, Nashville, Tenn.*

CASE 84.—Private Franklin Fisk, Co. I, 19th Me.; admitted July 10, 1863. Died 16th. *Post-mortem* examination: The lungs were adherent and hepatized in their lower lobes; the upper lobe of the left lung was in the stage of softening and the apex of the right filled with miliary tubercle. The pericardium was thickened and contained eight ounces of serum; the heart was normal.—*Act. Ass't Surgeon John Dickson, Jarvis Hospital, Baltimore, Md.*

CASE 85.—Private William King, Co. C, 15th Pa. Cav., was admitted March 25, 1864, much exhausted. He said he had been sick some time with consumption. Died 26th. *Post-mortem* examination: Body somewhat emaciated. Pericardium inflamed, containing serum and lymph. Adhesions with effusion of lymph and serum in left pleural cavity and lower two-thirds of lung hepatized red; right lung healthy except some old pleuritic adhesions. Liver and spleen enlarged; kidneys congested. Extensive peritonitis with effusion of serum and lymph degenerating into pus.—*Turner's Lane Hospital, Philadelphia, Pa.*

CASE 86.—Private Robert Close, Co. B, 8th Ill. Cav.; age 33; admitted March 6, 1864, with pneumonia. Died 14th. *Post-mortem* examination: Brain fifty-six ounces, much congested. Trachea and bronchi congested and lined with tenacious reddish-brown mucus. Right lung, thirty ounces, congested, especially at the base; left, fifty-seven ounces, solidified, adherent throughout by recent lymph and with seven ounces of serum in the pleural sac. Pericardium contained four ounces of dark liquid like mulberry-juice; heart flabby, reddish-brown in color and filled with fibrinous clots. Intestines normal but Peyer's patches prominent. Liver seventy-one ounces; spleen twelve

ounces and a half; pancreas three ounces; right kidney five ounces and a half, left seven ounces—all apparently healthy.—*Lincoln Hospital, Washington, D. C.*

Case 87.—Private John McLaughlan, Co. B, 23d Ill.; age 41; was admitted Nov. 2, 1864, with chronic synovitis. The knee-joint became much swollen, and on December 3 diarrhœa set in and the patient became sleepless at night. The bowels were regular on the 7th, but cough with purulent sputa had meanwhile developed. Astringents were discontinued and whiskey ordered to the amount of four ounces daily. On the 11th fine crepitation was detected over the lower portion of both lungs; skin hot and dry; pulse 120 and feeble. Tartar emetic was given in small doses. Delirium came on, and the patient died on the 15th. *Post-mortem* examination: Both lungs were slightly adherent and hepatized red, bordering on gray inferiorly. There were small patches of lymph in the pericardium. The knee-joint contained an ounce of sanious synovia; its cartilages were ulcerated.—*Act. Ass't Surgeon E. R. Ould, Hospital, Frederick, Md.*

Case 88.—Private Asa Reynolds, 5th N. Y. Art'y; age 19; was admitted March 22, 1864. He was feverish and complained of cough, acute pain in the right side and dyspnœa. Small doses of tartar emetic and sulphate of magnesia were prescribed. Next day the force and rapidity of the pulse were reduced, the pain and cough diminished and the bowels freely opened; but in the evening he became worse, the pulse rising to 160, the skin becoming dry, the sputa rusty and the pain in the side severe. He was very weak on the 24th, the abdomen tympanitic and tender and the stomach irritable. Medicine was omitted and beef-tea, wine and morphia directed to be used; turpentine stupes were applied to the abdomen. He died on the 27th. *Post-mortem* examination: Nearly the whole of the right lung was solidified and firmly adherent to the thoracic parietes; the left lung was considerably congested. The inner surface of the pericardium was roughened with lymph and the sac contained a little fluid. The stomach and intestines were healthy; the liver and kidneys congested.—*Hospital, Alexandria, Va.*

Case 89.—Simeon Snyder, recruit, 10th Ohio Cav.; age 18; was admitted Feb. 25, 1864, complaining of pain in the left side of the chest. His skin was hot and dry, tongue furred, pulse frequent and moderately full but irritable, respiration hurried. There was marked dulness on percussion, with some crepitation on the left side, sibilant and slight mucous râles on the right, heard best toward the apex of the lung. Five grains each of Dover's powder and bicarbonate of soda were given every three hours. On the 28th the patient became delirious, with lividity of face, rapidity of pulse and great difficulty of breathing; dulness was complete over the left side. A blister was applied. He died next morning. *Post-mortem* examination: There were firm pleuritic adhesions on the right side, with red hepatization and intense congestion of the upper lobe of the lung, about one-half of which sank in water. The left lung was hepatized red except at the lower edge of the upper lobe, where a strip about an inch wide remained crepitant, and at the apex, where were some spots of gray hepatization; the lower lobe, though apparently hepatized, floated in water, while the upper lobe, after the crepitant strip was cut off, sank promptly. The apex of the heart adhered to the pericardium by a narrow band of recent lymph which, at its cardiac extremity, was attached to a patch of lymph about half an inch in diameter; the right auricle contained a large fibrinous clot coated with black coagulum extending into the ventricle on one side and for many inches into the venæ cavæ on the other; the left cavities of the heart also contained a fibrinous clot which was prolonged into the aorta. The liver and kidneys were healthy. The other organs were not examined.—*Act. Ass't Surgeon T. J. Karber, Hospital No. 8, Nashville, Tenn.*

Case 90.—R. Ostis, a colored soldier under treatment for pleurisy, died suddenly while eating his breakfast in bed, Feb. 10, 1864. *Post-mortem* examination: Brain normal. The pericardium contained about one ounce of yellow liquid; numerous white, stringy deposits connected its visceral and parietal layers; a white fibrinous clot occupied the right auricle, interdigitating with the musculi pectinati and connecting with a smaller clot in the ventricle; the heart was a little to the right of its normal position. The left pleural sac was distended with a serous liquid which compressed the lung into a thin gray mass. The right lung was slightly adherent; its upper lobe was emphysematous and crepitant although injected; the middle lobe was less emphysematous; the lower lobe was hepatized and purulent posteriorly.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

Case 91.—*Post-mortem* examination of Reuben W. Baker, a white soldier, April 17, 1864: Arachnoid firmly adherent to dura mater at vertex; considerable fluid under the membranes at this part, the gyri being well separated and the pia mater coming out very readily; substance of brain but little altered. Pericardium contained six ounces of fluid, in which were some flocculent tufts; heart with clots in both sides and mitral valve thickened. Lower lobe of left lung red and injected; this lobe was bronchially crepitant throughout (*i. e.*, small bubbles came from the minute bronchi, but not from the pulmonary vesicles); there were faint spots of pus in the bronchial tubes, which were inflamed but not hardened or prominent; upper lobe crepitant, but with a tract that was hard, solid, indurated and nodulated. From one of the arteries near the root of the right lung was drawn out a long, hard, white clot; the lower lobe was adherent, solidified and grayish-red; the upper and middle lobes œdematous. The liver was large, soft and pale; the spleen pultaceous; the kidneys soft.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

Case 92.—Private James Fletcher, Co. A, 166th N. Y.; admitted April 24, 1865. Died 27th. *Post-mortem* examination: The right lung was hepatized; the left normal. The heart was healthy, but the pericardium contained six ounces of bloody serum. The intestines were healthy.—*Depot Field Hospital, 6th A. C., City Point, Va.*

Case 93.—Private Peter Brennan, Co. K, 5th N. H.; admitted Dec. 24, 1862, with a gunshot wound of the right thigh. Died April 22, 1865. *Post-mortem* examination: Carbuncle on right side posteriorly. Œsophagus pale, larynx slightly and trachea and larger bronchi intensely congested, with many dark-purple spots the size of mustard-seed. Right lung, twenty-six ounces, solidified at apex and with a thick layer of lymph on the pleura; middle lobe somewhat congested; lower lobe bluish-slate color, much congested, heavier than water but not hepatized. Left

lung, nineteen ounces, adherent and showing recent exudation and much venous congestion. Heart enlarged, with thickening of valves, clots in all the cavities, white elevated points on the endocardium, firm old adhesions on the left side, dark-purple spots on the pericardium and nine drachms of fluid in the serous sac. Liver dark-purple, lighter on section, soft, acini well marked; spleen soft, broken down. Stomach showing dark-purple spots; duodenum slightly congested; jejunum generally pale and valvulæ absent; much congestion near ileocæcal valve. Mucous membrane of large intestine pale, solitary follicles enlarged and numerous. Left kidney congested in cortical substance, pyramids pale, pelvis congested.—*Lincoln Hospital, Washington, D. C.*

Case 94.—Private Theodore Somers, Co. D, 55th Mass.; age 19; admitted Jan. 29, 1865. Dulness on percussion over the upper lobe of the left lung; severe cough; free expectoration; anorexia; excessive nostalgia; pulse 120, full and soft. 31st: Rolling about, looking anxious; wanting to die; refusing food and medicine. Died February 7. *Post-mortem* examination: Dark straw-colored liquid and lymph in pericardium. Apex of left lung solid, lower anterior part crepitant but sloughy; lower lobe dark brownish-red and doughy; miliary tubercle in right lower lobe. Liver pale and fatty; spleen small; kidneys granular.—*Third Division Hospital, Alexandria, Va.*

Case 95.—Private James Blackburn, Co. G, 18th Ky.; age 29; admitted Jan. 1, 1864. Died 5th. *Post-mortem* examination: Some emaciation. Firm pleuritic adhesions on both sides except anteriorly; apices of lungs filled with large hard tubercles, lower lobes hepatized gray. Pericardium and heart firmly adherent; valves thickened and much indurated; ascending aorta and arch containing ossific deposits. Liver, fifty-one ounces, healthy; spleen, three ounces and a half, very soft; kidneys, six ounces each, healthy.—*Hospital No. 1, Nashville, Tenn.*

Case 96.—Private John Henry, Co. E, 1st Vt., an Indian; age 29; died April 21, 1865. *Post-mortem* examination: Some serum was found in the sac of the arachnoid and in the ventricles of the brain. The lungs were adherent and the left pleural sac contained eight ounces of serum; the left lung, weighing thirty ounces, was engorged and presented spots of ecchymosis on its anterior surface and collections of softened tubercle, about the size of peas, near the middle of the upper lobe; the right lung, thirty-three ounces, was in a similar condition as to engorgement and ecchymoses, but presented only a few isolated tubercles. Finely granulated patches on the pericardium were supposed to be of a tubercular character. It was thought that the ileum presented isolated tubercles beneath the mucous membrane, but the distinction between these and the solitary glands was not clearly established. Other organs normal.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Three with peritonitis.

Case 97.—Private Clark D. Dexter, Co. L, 10th N. Y. Cav.; age 21; was admitted Feb. 19, 1863, as a convalescent from typhoid fever. He improved and in a short time had entirely recovered. On March 21 he complained of pain in the upper part of the chest on both sides and of some cough, but no dyspnœa; sonorous ronchus was heard, but both sides were resonant. Two days later, having been treated in the meantime with dry cups, blue-pill and ipecacuanha, the pain and cough had increased, the expectoration was slightly tinged with blood, and there was dulness with subcrepitant râles over the upper part of the left side. He suffered much from pain during the night of the 24th and did not sleep; next morning the expectoration was decidedly pneumonitic. Calomel, muriate of ammonia and Dover's powder were given every three hours; a blister was applied over the left lung and the whole chest was covered with an oil-silk jacket. On the 26th the abdomen was so painful and tender that complaint was made of the weight of the bedclothes. On the 28th there was bronchial respiration with dulness on percussion over the entire left lung. Carbonate of ammonia, syrup of squill and camphorated tincture of opium were given, with beef-tea and milk-punch. Next day the upper part of the right lung became involved; respiration was hurried and laborious. He died on the 31st. *Post-mortem* examination: Body somewhat emaciated. The brain was healthy. The right lung, twenty-five ounces, was partly adherent; the posterior part of its upper lobe was consolidated and grayish-purple; the remaining lobes were healthy. The left pleural sac contained nine ounces of serum; the lung, twenty-five ounces, was adherent to the parietes by thick, tough, recent lymph; its upper lobe was hepatized red, the lower lobe highly congested but not solidified. The right cavities of the heart were filled with fibrinous and mixed clots which extended into the pulmonary artery, and there were some patches of atheroma in the aorta. The omentum was contracted and drawn to the right side; the knuckles of intestine were united by a soft exudation. The liver, seventy-three ounces, was rather soft and adherent to adjoining organs in several places. The spleen, seven ounces and a half, was soft; the pancreas normal; the kidneys pale; the suprarenal capsules dark-colored; the mucous membrane of the bladder was injected and presented a number of black-bordered brown spots about a quarter of an inch in diameter. The mucous membrane of the stomach and duodenum was gray and not injected; in the rest of the small intestine the mucous membrane was of a light red-lead color; Peyer's patches were healthy to within four feet of the ileocæcal valve, below this point they were dark-colored but not elevated; the solitary glands were not visible, and there was no softening of the mucous membrane; the small intestine was distended with gas. The mucous membrane of the cæcum was gray and the solitary follicles numerous and prominent; the transverse colon was contracted; the rest of the large intestine normal.—*Ass't Surgeon Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 98.—Private Lawrence D. Gumble, Co. D, 1st Ark.; age 32; admitted Jan. 16, 1865,—tongue brown, pulse 120, bowels loose, severe pain in left side of chest, dulness and crepitant râles. Died 25th. *Post-mortem* examination: Left lung hepatized and sero-pus effused into left pleural cavity. Stomach distended with bilious liquid. Peritoneum over the liver and intestines inflamed and softened; abdominal cavity containing a considerable quantity of pus. Mucous coat of intestines healthy.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

Case 99.—Private Wm. R. Hamilton, Co. A, 2d Batt., 12th Tenn.; age 23; admitted Nov. 23, 1864,—tongue coated brown, corrugated and dry with red margins; pulse 120, sharp and full; respiration hurried; pain in chest; dulness

and sibilant râles over lower lobes of both lungs; slight cough with little expectoration; bowels tender on pressure and tympanitic. Died December 4. *Post-mortem* examination: Blood impoverished. Softening of left lung and effusion of serum and pus in the left pleura; hepatization of the lower lobe of the right lung. Heart normal. General adhesion of peritoneal surfaces; gall-bladder distended with a transparent albuminous fluid; spleen enlarged and softened; solitary follicles enlarged but not ulcerated.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

Eleven with erysipelas.

Case 100.—Private James T. Piper, Co. E, 73d Ind.; admitted Feb. 15, 1863, with erysipelas, the fourth successive attack from which he had suffered. He recovered under the use of tincture of iron and the local application of iodine, but on March 3 double pneumonia of a typhoid character set in; pulse 95; tongue dry; dyspnœa; rusty sputa. Notwithstanding active supporting treatment he failed gradually, drowsiness and subsultus appeared, and he died on the 17th. *Post-mortem* examination: Right lung, except a small portion anteriorly, adherent, hepatized and exuding a puro-sanguinolent fluid; left lung adherent by bands of false membrane, congested and with foci of extravasated blood. Heart, kidneys and small intestine normal; liver paler than natural, much enlarged, somewhat indurated; spleen small; mucous membrane of large intestine softened but not ulcerated.—*Hospital, Evansville, Ind.*

Case 101.—Private Samuel Estes, 2d Mass. Cav.; age 37. On admission, April 6, 1865, with pneumonia, this patient was convalescing from an attack of erysipelas of the face. He was delirious, but in a few days his intellect became clearer. He gradually improved under tonics and stimulants till the 20th, when he again became delirious, with pain in the right side and bowels, frequent pulse and dry red tongue. He passed into a typhoid condition and died May 5. *Post-mortem* examination: Right lung adherent posteriorly and with a purulent deposit over its apex, congested generally and its lower lobe infiltrated with pus. Four ounces of serum in pericardium; heart enlarged and softened. Liver pale; spleen and left kidney enlarged and softened.—*Cumberland Hospital, Md.*

Case 102.—Private Thomas E. Boyles, Co. B, 5th Ark. Cav.; admitted Dec. 25, 1864, with pneumonia and erysipelas. He was weak and very deaf in consequence of the extension of the swelling into the meatus auditorius, from which, on the 29th, pus was discharged. He died Jan. 7, 1865. *Post-mortem* examination: Pus and coagula lodged under the scalp in patches; external aural meatus much inflamed; tympanic membrane eroded and perforated. Right lung hepatized throughout; left hepatized in part; pleuræ adherent. Liver contained an abscess which had discharged into the peritoneal cavity.—*Act. Ass't Surgeon W. Matthews, Rock Island Hospital, Ill.*

Case 103.—William Dorey, Government employé; admitted March 25, 1864, with erysipelas. Pneumonia set in two days later, and on the 30th he became comatose and died. *Post-mortem* examination: Left lung congested; lower lobe of right hepatized red, upper congested. Heart and liver normal; spleen somewhat enlarged; kidneys slightly inflamed.—*Hospital No. 8, Nashville, Tenn.*

Case 104.—Private Henry B. Welker, Co. I, 87th Pa.; age 40; admitted March 30, 1865, from the Army of the Potomac, with erysipelas of the face. On April 6 he was suddenly attacked with gasping respiration and died in a few minutes. *Post-mortem* examination: Body somewhat emaciated. Heart healthy; pericardium thickened and containing a small quantity of serum; large fibrinous clots in the pulmonary artery and aortic arch. Right lung healthy; left firmly adherent and purulent throughout, with an abscess containing eight to ten ounces of pus which had burst into the trachea and filled the bronchial tubes; two pints of serum in the left pleural cavity. Liver somewhat enlarged; spleen infiltrated with pus; intestines normal.—*Stanton Hospital, Washington, D. C.*

Case 105.—Private George Andrews, Co. F, 3d Wis.; age 40; admitted May 15, 1865, with pneumonia of the right lower lobe. 17th: Stage of hepatization; erysipelas of face. 21st: Died. *Post-mortem* examination: Lower lobe of right lung hepatized, verging on gray; lower lobe of left lung congested. Heart soft and flabby; liver large, fatty; spleen small; intestines normal; kidneys somewhat fatty.—*Augur Hospital, Alexandria, Va.*

Case 106.—Private Daniel Bancroft, Co. G, 28th Mich.; age 38; admitted Jan. 28, 1865. Pain in chest anteriorly; much cough; sputa white, tenacious, abundant; pulse frequent, not hard; much fever at night, with remission in morning. 31st: Pain in left side; dyspnœa; dry cough; hot skin; frequent pulse; physical signs of pleuro-pneumonia. February 3: Pleuritic effusion in left chest, extending to fifth rib in front while sitting. 8th: Erysipelas of face; much dyspnœa; effusion unaltered; delirium. 12th: Failing; left pleura filling up. 14th: Died. *Post-mortem* examination: Left lower lobe hepatized throughout; a pint of serum and lymph in the pleural cavity and both pleural surfaces covered with coagulable lymph.—*Third Division Hospital, Alexandria, Va.*

Case 107.—Private William Upson, 12th Co., 1st Mich. Eng'rs; age 18; admitted Feb. 17, 1864, with pneumonia, which progressed favorably until the head and face became enormously swollen from erysipelas. 29th: Tongue very dry and black; sordes on teeth and gums; dyspnœa; eyes closed; delirium. Died March 4. *Post-mortem* examination: Left lung congested and in its lower part hepatized red and covered with recent exudation; right lung somewhat congested and adherent. Other viscera normal.—*Hospital No. 8, Nashville, Tenn.*

Case 108.—Private Jeremiah Brooke, Co. C, 15th Ark.; admitted Dec. 23, 1864, with pneumonia and erysipelas. Quite delirious; pulse weak, almost imperceptible; tongue inflamed, indeed, a general (somewhat erysipelatous) stomatitis; loss of appetite; emaciation; dyspnœa; great dulness on percussion except near sternal region, where, for a small space on each side, there was resonance; bronchial râles distinct and bronchophony in some places; slight facial erysipelas. He died Jan. 12, 1865. *Post-mortem* examination: Both lungs extensively hepatized; large white clots in the heart. No other morbid appearances.—*Act. Ass't Surgeon W. Matthews, Rock Island Hospital, Ill.*

Case 109.—Private Harrison Blake, Co. D, 71st Ohio; admitted March 14, 1864, much reduced, feeble and somewhat delirious. He improved a little under stimulant and supporting treatment, but on April 7 became lethargic

as erysipelas of the face made its appearance. He had been lying near an erysipelatous case. Died 20th. *Post-mortem* examination: Much emaciated. Meningitis; coagulated fibrin in longitudinal sinus. Both lungs hepatized red and the left pleural cavity containing a large quantity of serum and partially organized lymph. Three ounces of liquid in pericardium; heart pale and flabby; small firm clot in right auricle. Liver and kidneys healthy; spleen enlarged. Ileum much inflamed, showing patches of ulceration.—*Hospital No. 8, Nashville, Tenn.*

CASE 110.—Private Enos Campbell, Co. E, 39th Ga.; admitted Jan. 5, 1865, with pneumonia and erysipelas. Died comatose on the 7th. The patient was very weak and unable to speak; he had been expectorating blood and purulent matter for six weeks, but the erysipelas was recent and slight, affecting the face only. *Post-mortem* examination: Left lung hepatized; right not so much involved; both containing large deposits of tubercle and having old and recent adhesions. One pint of effusion in pericardium. Liver closely adherent to diaphragm.—*Act. Ass't Surgeon W. Matthews, Rock Island Hospital, Ill.*

Three with inflammation of the parotid glands.

CASE 111.—Corp'l William F. Harris, Co. D, 2d Ark. Cav.; age 48; had several attacks of bronchitis from exposure, and was admitted Dec. 10, 1864, with acute pneumonia. Tongue coated but margins red; bowels loose; pulse 90; some cough with expectoration; pain in right side; dulness over right lung; mucous râles. He continued thus until Jan. 10, 1865, when an enlargement of the right parotid gland was developed and typhoid symptoms came on. February 2: Tongue swollen enormously, filling the mouth and protruding. Died. *Post-mortem* examination: Great emaciation. Impoverished condition of the blood; hepatization of the right lung; pleuritic inflammation and effusion; congestion of the bowels.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

CASE 112.—Private John Ryan, Co. B, 7th N. Y. Heavy Art'y; age 20; admitted March 11, 1865, in a comatose condition. Both parotids were swollen. Died 17th. *Post-mortem* examination: Left parotid infiltrated with pus. Brain softened; serum in lateral ventricles; congestion of fourth ventricle; posterior and lower part of left lung solidified, fleshy and not granulated, the upper lobe in its posterior part containing small masses of coagulated blood, apparently due to apoplexy; right lung ecchymosed and the posterior part of its lower lobe mottled and heavier than water. Fibrinous masses on the surface of the liver, extending into the hepatic tissue; congestion of kidneys and mucous membrane of bowels.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

CASE 113.—Private Wallace Wilder, Co. H, 124th Ill.; age 24; admitted March 11, 1865, unconscious. Died 17th. *Post-mortem* examination: Congestion of the pia mater, brain-substance and walls of the ventricles; serum in the sac of the arachnoid. Engorgement of both lungs, with portions atelectatic; bronchial tubes reddened internally. Fibrinous clots in heart. Liver congested; spleen enlarged; kidneys, pancreas and bowels congested; right parotid infiltrated with pus; larynx normal.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Two cases fatal by hemorrhage into the pleural cavity.

CASE 114.—Private Andrew Magee, Co. K, 93d N. Y.; age 47; was taken with pneumonia of the left side May 2, 1864, and admitted on the 6th. Severe pain and dyspnœa. 13th: Urgent dyspnœa; fainting; unconsciousness for an hour. 15th: Very weak; dyspnœa; left side of chest much enlarged; no soreness and but little pain. 16th: Died. *Post-mortem* examination: Left lung consolidated throughout and but a fourth its normal size; five quarts of blood in its pleural sac.—*Mower Hospital, Philadelphia, Pa.*

CASE 115.—Private Charles Leary, 22d Pa.; age 26; was seized, Sept. 20, 1861, with fever and pain in the chest. 27th: Admitted with pleuro-pneumonia. Pulse 98, strong; skin cool and moist; tongue red at tip, coated grayish-white in centre; stools thin and involuntary; acute right iliac tenderness; slight borborygmus; no tympanites; dry, hacking cough; slight expectoration; submucous and sibilant râles in upper part of lungs, crepitation in axillary regions and a creaking leathery sound posteriorly. 28th: Sleep much interrupted by cough; towards morning raised blood; skin warm, dry; two stools, voluntary; dyspnœa; voice low; some delirium. Evening: Chest very sore; voice whispering; raised much blood; pulse 100, weak; some dyspnœa. While attempting to reach the chair, about twelve feet away, he threw up his arms and fell but was caught and put in bed by an attendant. He breathed a few times with a gurgling sound and died. *Post-mortem* examination: Thorax filled with blood, left lung in some places nearly gangrenous.—*Seminary Hospital, Georgetown, D. C.*

Twenty cases terminated in abscess or circumscribed disintegration of the pulmonary tissue.

CASE 116.—Private Henry Henning, Co. I, 54th Pa.; age 44, but apparently over 60; German, and unable to speak English; admitted April 16, 1864, with pneumonia. Breathing rapid and laborious; pulse small, occasionally fluttering, about 120; tongue large, pale, edges indented and moist, dorsum coated white with a central brown stripe; sharp pain in cardiac region; anorexia; great prostration; dulness of left side. 17th: Friction sounds, moist râles and absence of vesicular breathing on left side; dulness on percussion over lungs; action of heart laborious, pulsation visible; he has no appetite and lies most of the time, without delirium but comatose. 19th: No improvement. 20th: Gradually failing. 21st: Seized afresh with paroxysmal pain. 22d: While raising him in bed he fell back and died. *Post-mortem* examination: Left pleura adherent and containing two pints of liquid; lungs dark-blue, mottled, melanotic externally and on section showing abscesses and hepatized tissue, with crepitus limited to the apices. Pericardium embedded in fatty deposits. Heart enlarged and fatty, liver-brown in color and friable. Liver normal; stomach and intestines distended with flatus.—*Cumberland Hospital, Md.*

CASE 117.—Private Albert Ladd, Co. D, 15th N. Y. Cav.; age 20; admitted May 18, 1864, with pneumonia. Died

24th. *Post-mortem* examination: Left lung and middle and lower lobes of right hepatized and purulent; pleura on both sides firmly adherent. No other organs examined.—*Cumberland Hospital, Md.*

CASE 118.—Joseph Walden, Missouri guerrilla. Typhoid pneumonia. [No dates given.] *Post-mortem* examination: Body greatly emaciated. There was effusion in the right pleural cavity; the lower lobe of the right lung contained a large abscess and its pleura was covered with pus. The right auricle contained large white clots. The spleen was enlarged.—*Act. Ass't Surgeon H. C. Newkirk, Rock Island Hospital, Ill.*

CASE 119.—Wm. E. Watkins, Co. B, 19th S. C.; age 18; admitted Nov. 3, 1864. On this day he had a chill followed by fever, with pain in the right side and dry cough; pulse 140; respiration 50. His condition remained comparatively unchanged until the 7th, when liquid gathered in the right pleural cavity. The pulse increased to 150 and the respiration to 60 shortly before death on the 10th. *Post-mortem* examination: A large abscess in the lower lobe of the right lung had discharged into the pleural cavity.—*Act. Ass't Surgeon H. H. Russell, Rock Island Hospital, Ill.*

CASE 120.—Private Otto C. Murray, Co. H, 1st Md., was admitted May 19, 1863. The patient's comrades stated that he had been suffering for about two months with pneumonia. He was delirious and had a flushed, anxious face, rapid and rather feeble pulse, dry tongue and great thirst; respiration was hurried, with violent cough and free expectoration of thick viscid matter; the stools were frequent, thin and yellow. There was dulness with crepitation over the right lung, and dulness below with a harsh respiratory murmur over the left lung. He constantly carried his left hand to the right side of the head, but his right arm seemed useless. On the 28th he vomited bilious matter freely and had a discharge from the right ear. He died next day. *Post-mortem* examination: Two ounces of serum were found at the base of the brain and half an ounce of pus in the right ventricle; the brain-substance was much broken down and softened, weight forty-four ounces. The right tonsil was much ulcerated, the ulceration extending into the Eustachian tube. The right lung was hepatized and contained an abscess in the lower lobe communicating with the upper edge of the liver; the lower lobe of the left lung was hepatized. The heart was normal. The liver, seventy-six ounces, was congested in regions, disintegrated and fatty; four distinct abscesses, containing about a pint and a half of pus, were found in the right lobe. The intestines were healthy. The kidneys were normal in size but somewhat fatty.—*Hospital, Frederick, Md.*

CASE 121.—Private William Boulton, Co. D, 21st N. Y. Cav.; age 46; was admitted May 17, 1864, with pneumonia and a trifling cough and expectoration. He was cheerful and hopeful, had a good appetite, and was able to sit up, read, write and converse; sputa sometimes tinged with blood. He became steadily emaciated, and was found dead in bed on the morning of July 16. *Post-mortem* examination: Universal congestion of lungs and infiltration with dark grumous blood, small abscesses developing here and there. Heart pale, flabby, friable and fatty, containing fibrinous clots in right ventricle. Liver and intestines normal.—*Cumberland Hospital, Md.*

CASE 122.—Private Charles W. Moore, Co. D, 60th Ohio; age 22; admitted May 7, 1864, with typhoid pneumonia. Dulness and crepitant râles over both lungs; sputa scanty, rusty and very viscid. 8th: Pulse 85 to 90, compressible. 10th: Delirious; occasional vomiting, much dyspnœa; respiratory murmur faint in upper part of lungs, absent at base. 11th: Delirium furious; pulse rapid and small; less dyspnœa; slight expectoration. 12th: Sinking rapidly; muttering delirium; pulse scarcely perceptible; face purplish; mucous obstruction in air-tubes; he occasionally clasped his head. Died at 3.30 P. M. *Post-mortem* examination: Lungs hepatized throughout; a small abscess in middle lobe of right.—*Hospital 24th and South streets, Philadelphia, Pa.*

CASE 123.—Private Ira Woodcock, Co. E, 28th Mich.; age 29; admitted Jan. 26, 1865, from regimental hospital with pneumonia. Died February 12. *Post-mortem* examination: No emaciation; much suggillation posteriorly. Right pleura adherent and containing three pints of serum with large flakes of unorganized lymph; upper and lower lobes of lung hepatized and two small abscesses in lower lobe. Left pleura normal but lung congested. Pericardium and heart normal. Liver slightly enlarged and engorged. Other abdominal viscera normal.—*Second Division Hospital, Alexandria, Va.*

CASE 124.—Private J. F. Dean, Co. I, 43d N. C.; admitted Dec. 11, 1863. Died Jan. 1, 1864. *Post-mortem* examination The larynx and trachea were of a pale greenish-blue color but otherwise normal. Both lungs were inflamed; the first lobe of the right lung was hepatized red and gray and had at its base, posteriorly, a large abscess the size of a teacup filled with offensive pus and broken-down pulmonary tissue; the second lobe was splenified; the third in the last stage of red hepatization. The liver was very large and presented whitish lardaceous spots; the spleen was flabby; the kidneys congested.—*Ass't Surgeon Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

CASE 125.—*Post-mortem* examination of Richard Roster, a colored soldier, Feb. 2, 1864: The pericardium was full of fluid; the right auricle contained a large white clot and the ventricle a smaller clot. The left lung, with the exception of its anterior edge, was adherent to the thorax and its lobes were united; its substance had traits of a pale, solid structure, with here and there a well-defined pus-cavity; a few spots of a dull-red color distinctly resembled hepatization. The right lung was free from parietal adhesions but its lobes were partly interadherent; it was more decidedly tubercular but less congested, admitting air more freely than the other. The liver was unusually purplish; the spleen and kidneys natural.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

CASE 126.—Private George Dewley, Co. E, Alexander's Va. Batt'y; admitted Nov. 4, 1864. Pneumonia. Died 6th. *Post-mortem* examination: The right greater pectoral muscle had a gelatinous appearance. Both pleural sacs were full of liquid. There was an abscess in the right lung. The heart was one-third larger than usual and contained a clot. The spleen was softened.—*Act. Ass't Surgeon H. H. Russell, Rock Island Hospital, Ill.*

CASE 127.—Private Bradford Lewis, Co. H, 13th S. C., died of typhoid pneumonia Jan. 17, 1864. *Post-mortem* examination: There was a good deal of serum in the cerebral membranes; the brain-substance was hardened, its ven-

tricles were enlarged but contained little fluid; the choroid vessels were pale. The pericardium was full of serum. The left lung was adherent behind and had several abscesses in its substance; the right was adherent except anteriorly, and on section presented many cartilaginous indurations. The liver was normal; the transverse colon contracted.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

CASE 128.—Captain D. W. Parks, Co. E, 54th N. C.; age 33; admitted May 10, 1863. Died June 12. *Post-mortem* examination: The brain was healthy. The mucous membrane of the trachea was softened, pale in its upper portion and purplish towards the bifurcation. The right lung weighed twenty-two ounces and a half; the whole of its lower lobe and the posterior portions of the other lobes were solidified and contained circumscribed collections of pus; the middle and lower lobes were interadherent and coated with yellowish lymph. The left lung weighed eighteen ounces; its lower lobe was affected like that on the opposite side, but it was less firmly solidified and contained fewer pus deposits; the left pleural sac contained sixteen ounces of pus. Two ounces of liquid were found in the pericardium; venous clots and uncoagulated blood in the right cavities of the heart, and a small clot in the left side. The liver weighed fifty-eight ounces; the spleen, nineteen ounces, was extremely soft; the pancreas and kidneys normal. Some regions of hyperæmia were observed in the small intestine, but the large intestine was healthy.—*Ass't Surgeon Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

CASE 129.—Private William Schroeder, Co. G, 1st Conn. Cav.; age 28; was admitted Dec. 27, 1864, with an ulcer on the leg. He died Feb. 9, 1865. *Post-mortem* examination: The upper half of each pleural cavity was obliterated by adhesions; the lower half on the right was filled with pus, on the left with turbid serum; both lungs contained many abscesses. The heart was normal and contained fibrinous clots. The liver was much congested; the spleen natural; the kidneys were degenerated, presenting many abscesses which seemed of recent formation.—*Act. Ass't Surgeon B. B. Miles, Jarvis Hospital, Baltimore, Md.*

CASE 130.—Private John Lower, Co. C, 178th Ohio, was admitted Feb. 6, 1865, with pain in the right side and cough of several weeks duration. He improved under treatment until March 1, when, having imprudently exposed himself, his symptoms became aggravated; dulness over greater part of right side. 8th: Delirium; skin yellow. He became steadily weaker and died on the 25th. *Post-mortem* examination: Right lung adherent at apex and anteriorly, carnified, containing several small abscesses, and compressed against the anterior wall by seventy-five ounces of pleuritic effusion and lymph-flakes; left lung adherent at apex and posteriorly, some hypostatic congestion. Liver congested and with patches of recent lymph on its upper surface.—*Douglas Hospital, Washington, D. C.*

CASE 131.—Private Lewis H. Slone, Co. H, 8th Mich., was admitted July 24, 1864, from City Point hospital, Va., with bronchitis. The sputa had a bad odor. He died August 16. *Post-mortem* examination: Larynx, heart and left lung healthy. Right lung universally adherent and of a livid-red color; its lower lobe very soft in texture, resembling the spleen; a portion of the lobe occupied by an abscess of gangrenous appearance containing about six ounces of fetid pus. Liver fatty; spleen firm; kidneys normal.—*Fairfax Seminary Hospital, Va.*

CASE 132.—Private John Brodder, 29th Colored Troops; age 21; was admitted March 9, 1865, with pneumonia. The patient was restless; complained of pain in the chest and coughed considerably; there was dulness on percussion over the lower lobe of the left lung. A blister, cough mixture and Dover's powder were prescribed. On the 13th the pulse was 100, tongue dry, skin hot and expectoration stringy and tenacious. Poultices, stimulants and beef-extract were ordered. Diarrhœa set in on the 17th, the pulse rose to 120, and the patient became slightly delirious. Next day the delirium increased; respiration 44; sputa streaked with blood. He died on the 19th. *Post-mortem* examination: There were pleuritic adhesions on both sides. Four abscesses the size of walnuts were found in the upper lobe of the right lung; the lower lobe was in a state of gray hepatization. The left lung was congested, its lower portion hepatized. The pericardium contained two ounces of serum. The other viscera were normal.—*Act. Ass't Surgeon S. D. Twining, L'Ouverture Hospital, Alexandria, Va.*

CASE 133.—Private Peter Keough, Co. F, 58th N. Y.; age 23; was admitted Feb. 2, 1864. He had been suddenly attacked with great pain in the lower portion of both lungs. Respiration was frequent and very painful, the pulse rapid and the patient much prostrated. He was treated with alcoholic stimulants and small doses of quinine and morphia, with belladonna plasters to the chest and nourishment. He died on the 17th. *Post-mortem* examination: The right lung was adherent and contained a large abscess in its lower lobe; there were some adhesions and much serum on the left side of the chest. The pericardium was filled with effused liquid. The liver was enlarged.—*Act. Ass't Surgeon L. L. Tozier, Ladies' Home Hospital, N. Y. City.*

CASE 134.—Private Jno. H. Lamberton, Co. M, 11th N. Y. Cav.; admitted Feb. 26, 1864. Pneumonia. Died March 1. *Post-mortem* examination: Body emaciated. There was a large abscess filled with pus in the lower lobe of the left lung; its upper lobe was adherent. The liver was much enlarged, weighing nearly eight pounds. The other viscera appeared healthy.—*Act. Ass't Surgeon A. D. Ruggles, Harewood Hospital, Washington, D. C.*

CASE 135.—Private Lewis Swarer, Co. A, 98th Pa.; admitted April 21, 1863. Typhoid pneumonia. Died 22d. *Post-mortem* examination: Body much emaciated; parotid and submaxillary glands in a state of suppuration. The pleural sacs were partly obliterated by adhesions and contained straw-colored serum; the lower lobe of the right lung was hepatized, the middle and upper lobes infiltrated with pus; an abscess in the left lung communicated with the pericardium, in which was a large quantity of pus. The liver was enlarged, pale and fatty; the gall-bladder nearly empty; the spleen normal; the mesentery wasted; the stomach and intestines pallid and empty.—*Act. Ass't Surgeon Thos. H. Elliott, Harewood Hospital, Washington, D. C.*

Three in gangrene.

CASE 136.—Private Augustus Adderhold, Co. C, 1st Wis. Art'y; was admitted Jan. 27, 1864. Died Feb. 7. *Post-mortem* examination: The brain and its membranes were healthy, but the Pacchionian bodies were enlarged and

had almost perforated the skull-cap. There was some pleuritic congestion but no adhesion; the upper and middle parts of both lungs were solidified, black on section, with here and there a dirty yellow color and gangrenous odor; the lungs weighed eighty-two ounces. The heart was enlarged and flabby and contained a dark-colored fibrinous clot in each ventricle. The liver was enlarged, weighing eighty ounces; the large intestine was somewhat congested. The other viscera were normal.—*Act. Ass't Surgeon K. J. Sample, Hospital No.* 19, *Nashville, Tenn.*

CASE 137.—Private Robert Mickey, Co. C, 11th Pa.; admitted Jan. 17, 1865, with bronchitis. Died 24th. *Post-mortem* examination: The right lung, thirty-four ounces, was gangrenous; the left, eighteen ounces, adherent at its apex; a large abscess under the parietal pleura contained a pint of pus and extended to the first lumbar vertebra. The heart was healthy; the liver pale, presenting the nutmeg appearance on section; the spleen soft; the intestines and kidneys normal.—*Fifth A. C. Field Hospital, Army of the Potomac.*

CASE 138.—Dan. Vandercrook, Co. D, 17th Pa. Cav.; age 21; admitted June 15, 1863. Diagnosis: Typhoid fever. On admission there was much fever with delirium and pneumonia of the right side. On the 20th he coughed a good deal and expectorated profusely, the fever having meanwhile abated, leaving him rational. By the 27th he was noticeably gaining strength, but on the 29th his cough became constant, sputa profuse, grumous and fetid and the odor of his breath intolerable. He grew rapidly worse, and died July 3. *Post-mortem* examination: Pleuritic adhesions on right side, involving lower lobe; gangrene of half of right lung and inflammation and softening of the other half; tubercular deposits in apices of lungs.—*Act. Ass't Surgeon W. J. Hazelton, Fairfax Seminary, Va.*

Two in liquefaction of the lungs.

CASE 139.—Private John Lerton, Co. D, 1st E. Tenn., had suffered from cough, fever and diarrhœa for some time prior to admission, March 23, 1863. He was pale, emaciated and very weak; tongue slightly furred; appetite poor; skin dry and harsh; pulse 100; stools frequent. 24th: Pain in chest; cough; dulness and gurgling over left side. 30th: Pulse 120; expectoration free. April 1: Pulse very feeble; prolonged cough with copious purulent sputa; vomiting. The disease steadily intensified. Died 15th. *Post-mortem* examination: Much emaciation. Left lung entirely suppurated and non-existent, the pleural cavity filled with sero-pus; old adhesions on right side; bronchial glands enlarged, some indurated.—*Hospital No.* 23, *Nashville, Tenn.*

CASE 140.—Private Elisha Bedsaul, Co. I, 63d Va., rebel; age 30; was admitted Jan. 27, 1864, with consumption. Died March 9. *Post-mortem* examination: The right pleural cavity contained seventy ounces of purulent liquid; lower lobe of the left lung slightly hepatized. The heart, liver, spleen and kidneys were normal.—*Hospital No.* 1, *Nashville, Tenn.*

Ten cases of coexisting tubercle.

CASE 141.—Private Lewis Malling, Co. B, 180th Ohio; age 43; was admitted Feb. 1, 1865. Severe dyspnœa; prostration; pulse feeble, 120; sordes on teeth and gums; expectoration difficult, rust-colored; large crepitation and dulness over lower part of right lung. Died 4th. *Post-mortem* examination: Effusion with several bands of adhesion in right pleural cavity; apex of lung containing tubercular deposit, yellow and hard, surrounded by well-marked congestion, middle lobe somewhat congested, lower lobe consolidated, granular, friable and nutmeg-colored; apex of left lung tuberculous, remainder healthy. Other viscera healthy.—*Douglas Hospital, Washington, D. C.*

CASE 142.—Private John Vallian, Co. B, 63d Ga.; admitted Nov. 29, 1864. Much emaciated; countenance anxious; tongue dark-brown with edges and tip red; bowels loose; skin dry; great thirst; dulness over right side; vesicular murmur absent and respiratory motion almost imperceptible; mouth and limbs showing signs of scurvy. Died 30th. *Post-mortem* examination: Right lung hepatized and containing calcareous masses, left lung with tubercular masses in its apex. Heart enlarged, its walls thinned and fatty. Liver and stomach, small and large intestines, greatly congested; large intestine thickened and lumen contracted to three-quarters of an inch; mesenteric glands enlarged.—*Act. Ass't Surgeon M. Hale, Rock Island Hospital, Ill.*

CASE 143.—John Kemper, substitute, age 44; admitted July 20, 1864. He caught cold about a week before admission, while en route to his regiment. His countenance was pale and he suffered from cough, dyspnœa and acute diarrhœa. There was dulness over the apex of the right and lower part of the left lung. The heart-sounds were muffled and indistinct, but a clear metallic sound was heard over the apex during the first beat. The diarrhœa was checked, but the cough and dyspnœa became so distressing that the patient had to sit up constantly. From August 15 till death, on the 30th, the heart-sounds could not be heard or the pulsation felt. *Post-mortem* examination: The upper anterior edge of the left lung adhered to the right costal cartilages, the outer inferior edge to the left costal wall, the inner inferior edge to the diaphragm; a long membranous band stretched outward, forward and slightly upward from the anterior surface of the upper lobe to the parietal pleura about the third rib; the lung was compressed by two pints of liquid, but a space of half-gallon capacity remained anterior to the effused liquid. The heart was rolled over to the right side so that the outer side of the left ventricle presented forward under the anterior edge of the left lung, and the anterior surface of the right ventricle was pushed under the adherent inner edge of the right middle lobe. The right lung was compressed anteriorly and adherent by its entire outer surface to the parietal pleura: its apex contained a cartilaginous-walled abscess the size of a small orange, and its remaining parts were darkened by close, black, mottling deposits: the middle lobe and lower lobe posteriorly were crepitant and dark-red. The substance of the left lung was speckled with scattered tubercular deposits of the size of raisins and also with dark deposits as on the right side: the anterior edge of the lower lobe contained two abscesses of the size, respectively, of a walnut and of a raisin. The heart was enlarged, pale and softened: a large black coagulum, tipped with fibrin.

filled its right side. The liver was large, smooth on its surface, granular, dotted clay-yellow; the spleen of normal size, light-colored, bloodless, softened; kidneys small; intestines healthy.—*Third Division Hospital, Alexandria, Va.*

Case 144.—Private Consider Cole, Co. B, 32d Me.; age 45; admitted Feb. 10, 1865, much debilitated; cough; dyspnœa; dulness over both lungs. April 2: Dyspnœa urgent; extremities cold; face livid; crepitant râles distinct on both sides. 7th: Died. *Post-mortem* examination: Miliary tubercle in upper lobes of both lungs; lower lobes congested; pleuræ firmly adherent. Liver enlarged, fawn-colored, fatty; mesenteric glands enlarged, some calcareous.—*Third Division Hospital, Alexandria, Va.*

Case 145.—Private Theodore Seifert, 9th Ohio Cav.; age 18; admitted March 8, 1864. Pneumonia. Progressed favorably until the 16th, when jaundice set in. Died 23d. *Post-mortem* examination: Much emaciation. Both lungs adherent and bronchial tubes inflamed; lower lobe of left lung posteriorly hepatized, exuding on section a bloody liquid or a grayish frothy fluid; upper lobe friable, its apex containing tubercle; apex of right lung presenting cicatrices of old tubercles; base of lower lobe disorganized. Heart hypertrophied; left ventricle three-quarters of an inch thick. Liver and kidneys normal; spleen enlarged.—*Hospital No. 8, Nashville, Tenn.*

Case 146.—Private William B. Gerry, Signal corps, C. S. A.; age 18; admitted Oct. 27, 1863, for acute pneumonia of three days' duration: Pain in chest; cough with viscid expectoration; fever; much emaciation and weakness. December 15: Walking about; cough subsiding; diarrhœa; emaciation and weakness. 20th: Jaundice and diarrhœa. Jan. 1, 1864: Cough and expectoration; evidences of phthisis; passages frequent and thin. He gradually failed, and died February 4. *Post-mortem* examination: The left lung was congested, its apex filled with hard tubercle and its centre containing a cavity the size of a small hickory nut filled with pus; the right lung was congested but free from tubercle. The colon and lower portion of the ileum exhibited much arterial injection, the former presenting one small ulcer. The spleen was much enlarged. The mesenteric glands were enlarged and tuberculous. The other organs were apparently healthy.—*Act. Ass't Surgeon G. McC. Miller, Hospital, Point Lookout, Md.*

Case 147.—Richard Bush, colored; age 13; admitted May 27, 1864, with pneumonia. Died July 18. *Post-mortem* examination: Both lungs were extensively adherent and appeared to be in the third stage of pneumonia, presenting also tubercular deposits, especially in the upper lobes. A gallon of serum was found in the chest and abdomen.—*Hospital, Alexandria, Va.*

Case 148.—Recruit Henry Hackett; admitted Oct. 31, 1864, with pain, labored breathing and dulness or percussion over the left side of the chest. Ipecacuanha, stimulants and counter-irritants were employed. Died November 9. *Post-mortem* examination: The left lung was in a state of gray hepatization and the pleural cavity contained four pints of liquid; the right lung was much congested. Both lungs, the bronchial glands and the spleen contained tubercular deposits. The other viscera appeared to be normal.—*Act. Ass't Surgeon W. K. Fletcher, L'Ouverture Hospital, Alexandria, Va.*

Case 149.—Private William C. Stevens, Co. B, 14th U. S. Inf.; admitted Aug. 10, 1862. Typhoid pneumonia. Died 22d. *Post-mortem* examination: The pleura of both lungs was inflamed and covered with recent pseudomembrane; the lungs were much congested and had extravasated patches in several places; miliary tubercles were diffused throughout their parenchyma. The other organs appeared natural.—*Act. Ass't Surgeon J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 150.—Private Solomon P. Herndon, Co. E, 81st Ind.; age 40; admitted March 19, 1864, with severe cough, dyspnœa and pain in the right side of the chest. April 12: Respiration hurried, labored and superficial. He sank rapidly, and died on the 15th. *Post-mortem* examination: Pleural cavity contained over two pints of sero-purulent liquid; lungs adherent to parietes by plastic exudation; upper lobe of right lung contained a large vomica surrounded by tubercles filled with calcareous deposits; left lung congested and in part hepatized. Spleen enlarged, weighing nearly two pounds, friable.—*Hospital, Madison, Ind.*

Six cases in which the brain or its membranes were inflamed.

Case 151.—Private Orlando Newkirk, Co. A, 43d N. Y.; age 25; admitted July 30, 1863, having been in low condition and delirious with typhoid pneumonia for ten days previous. He suffered from diarrhœa with frequent vomiting. Died August 6. *Post-mortem* examination: The brain weighed fifty-four ounces and was soft; the posterior portion of the cerebrum was intensely red; the ventricles contained half a drachm of bloody liquid. The trachea was filled with frothy secretion, congested purplish in its lower portion and at its bifurcation enlarged and softened. The mucous membrane of the epiglottis and upper half of the larynx was purple; in the lower half it was pale. The right lung, thirty-one ounces, was slightly congested, intermingled with dark spots, but its base was hepatized red and the centre of its third lobe was grayish, solid and heavier than water. The lower portion of the first lobe of the left lung was covered with a layer of recent lymph and its substance was hepatized gray; the second lobe was dark-blue externally and on section reddish-purple and solidified in nodular masses; the lung weighed thirty-four ounces. The heart contained mixed clots and the pericardium eleven drachms of fluid. The liver and pancreas were healthy; the spleen large and soft. The mucous membrane of the stomach was parti-colored with a deep purplish patch in the centre. Peyer's patches and the solitary glands in the large as well as the small intestine were congested, but neither ulcerated nor elevated. The kidneys were much congested and firm, their pelves pale but with numerous injected points.—*Ass't Surgeon Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 152.—Private Joseph Lynch, Co. D, 99th N. Y.; age 44; admitted March 11, 1865, insensible. Muttering delirium, jactitation, coma and death on 18th. *Post-mortem* examination: Capillary congestion of cerebrum, serum in lateral ventricles and congestion of floor of fourth ventricle. Right lung black posteriorly, dark-red anteriorly,

lowest lobe solidified; left lung congested, ecchymosed spot under pleura in anterior portion of lower lobe. White clots in both ventricles. Spleen enlarged; kidneys and bowels congested.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Case 153.—Private John Ira Pickett, Co. D, 14th Ill.; age 15; admitted May 28, 1864. Died June 17. *Post-mortem* examination: Brain inflamed. Right lung hepatized, especially in lower lobe; slight pleuritic adhesions. Intestines inflamed throughout.—*Hospital No. 8, Nashville, Tenn.*

Case 154.—Private Abraham Gobbohey, Co. G, 77th Pa.; age 25; admitted March 25, 1864, delirious and almost moribund. Died 30th. *Post-mortem* examination: Dura mater very dry and showing signs of inflammation; lymph deposit on arachnoid; three ounces of reddish serum in the membranes. Both lungs were adherent and the pleural cavities contained effusion; the upper lobe of the left lung was infiltrated with pus, the upper lobe of the other hepatized red. The heart was full of black clotted blood. Liver much congested, nutmeg; spleen normal; kidneys enlarged, congested and granular.—*Hospital No. 8, Nashville, Tenn.*

Case 155.—Corp'l William Clark, Co. A, 2d Tenn. Cav.; admitted April 9, 1864, with a swelling in the neck which suppurated under the right inferior maxilla. Died May 2. *Post-mortem* examination: Membranes of brain slightly inflamed. Right lung hepatized red in its lower lobe and presenting some tubercles, slight adhesions and six ounces of liquid with a mass of lymph in the pleural cavity; left lung normal but for some *post-mortem* congestion. Heart, liver, spleen and kidneys normal. Colon congested. Purulent discharge from abscess in neck profuse; tissues beneath superficial fascia infiltrated and disorganized for a space four inches long by three wide.—*Hospital No. 8, Nashville, Tenn.*

Case 156.—Private Peter Gargon, Co. E, 10th N. Y. Cav.; age 43; admitted and died March 23, 1865. Diagnosis: Syphilis. *Post-mortem* examination: Some ecchymoses along region of spine. Brain weighed forty-eight ounces and a half; ventricles filled with serum and lymph. Mouth, pharynx and larynx inflamed; œdema of glottis. Right lung, eighteen ounces, lower lobe partially hepatized; left lung, twenty-nine ounces, lower lobe hepatized red, part of upper gray. Heart normal. Stomach normal; duodenum slightly inflamed; some glairy mucus in small intestine; hard black faces impacting large intestine, by which, in some places, the mucous membrane was slightly disgorged, in others disorganized. Liver forty-seven ounces and a half; spleen six ounces; kidneys each four ounces and a half.—*Lincoln Hospital, Washington, D. C.*

Analysis of the post-mortem appearances in three hundred cases of acute lobar pneumonia.

A general view of the pathological characters of the acute lobar cases has already been outlined by the method adopted for their presentation. Those giving no details save of congestion, hepatization, etc., have been illustrated by typical selections. Those that terminated in abscess, gangrene, liquefaction of the lungs, etc., as well as those complicated with co-existing tubercular, malarial or enteric disease, or by the supervention of other inflammations, as of the pericardium, peritoneum, parotids, etc., have been pointed out incidentally as they were submitted.

Included among these cases are probably some which might have been placed with propriety in the series of secondary pneumonias, pre-existing bronchitis or chronic pneumonitic processes having been possibly connected with their development.

The terms of the record are frequently indefinite. In some cases a lung or portion of a lung is described as normal, healthy or crepitant; but usually only those parts that were found to have undergone change left their condition recorded. The absence of a specific statement to the contrary must therefore, be assumed to imply a healthy condition in certain of the lobes or lungs.

Localization of the pneumonitic conditions.—The right lung alone was affected in 51 cases or 17.0 per cent. of the whole number; the left in 35 cases or 11.7 per cent.; while both were implicated in 214 cases or 71.3 per cent. The right lung was, therefore, affected in 265 cases or 88.3 per cent.—the left in 249 cases or 82.0 per cent. of the whole number.

Viewing the lungs as divided into upper and lower lobar masses, by considering the middle lobe of the right lung as a part of the upper lobe, the relative frequency of the affection of the lobes may be expressed as follows: In every hundred cases the upper lobe of the left lung was abnormal 69.0 times, of the right lung 76.7 times; the lower lobe of the left lung 79.3 times, of the right lung 84.7 times. These percentages are derived from the tables at page 780.

The apices and anterior margins of the lungs suffered least. They were frequently pervious and uncongested when the lung generally was consolidated; sometimes they were emphysematous. The lower lobes were not only more frequently but more intensely affected than the upper; congestion of the latter and hepatization or softening of the former were often associated. A few exceptional instances occurred in which the lower lobe was unaffected and the upper diseased. A few also were noted in which, as in 68, the middle lobe of the right lung remained healthy while its other lobes were completely hepatized.

Circumscribed purulent accumulations or abscesses are said to have been present in twenty-four of the cases, 116–135 and 101, 104, 143 and 146. They were situated in both lungs in *three* cases, 116, 117 and 129, in which they constituted the characteristic morbid appearances. They were also noted in both lungs in the three cases, 127, 128 and 143, but an intense engorgement is described as the principal pathological change in the first of these, solidification of the pulmonary tissue in the second and tubercular deposits in the last. The abscesses were confined to the right lung in the *two* cases, 126 and 130, constituting the characteristic feature in the former only, the lung in the latter being carnified and the abscesses small. They were confined to the left lung in the *four* cases, 104, 125, 127 and 135; in 125 the lung was solidified and the abscesses incipient, but in the others the purulent deposits were the

prominent appearances; in 135 the abscess communicated with the pericardial sac, which also contained pus, and the opposite lung was in the condition of so-called purulent infiltration; in 104 the patient appears to have been suffocated by the rupture of the abscess into the trachea. One lobe only was the site of the abscesses in the remaining *twelve* cases. In no case was the deposit situated in the upper lobe of the left lung. In one case, 134, it occupied the lower lobe of the left lung; in another, 146, in which the lung was congested, a small abscess was discovered in its middle. Abscesses were confined to the upper lobe of the right lung in the four cases, 101, 122, 124 and 132,—in the first associated with purulent infiltration of the lower lobe, in the second forming a small collection in a hepatized lung, and in the other two constituting the chief morbid feature of the lobe. Abscesses were confined to the lower lobe of the right lung in six cases: In 123 they were small in a hepatized tissue; in the others, 118, 119, 120, 131 and 133, they assumed a greater prominence,—in 131 the abscess was foul-smelling and gangrenous, in 119 the pleura was covered with pus, and in 120 the lesion was sequent to inflammation of the ear and of the cerebral substance.

Table LVIII.

Localization and specification of the morbid conditions found in the lungs in 300 cases of acute lobar pneumonia.

	Right lung.		Left lung.	
Total number of cases	300		300	
Lung said to have been healthy	13		14	
Condition of lung not stated, but healthy inferentially	22		37	
Lungs presumably normal	35		51	
Lungs reported as diseased	265		249	
Reported condition of lobes in diseased lungs.	Upper and middle.	Lower.	Upper.	Lower.
Congestion, engorgement, œdema and splenization	66	64	65	74
Inflammation and solidification	6	8	11	13
Hepatization	70	90	52	66
Red hepatization	22	24	16	24
Gray hepatization	36	36	23	31
Purulent infiltration, softening and liquefaction	10	9	13	11
Compression, collapse, carnification	11	12	9	10
Abscess (*a*)	7	9	6	7
Gangrene	2	2	3	2
Stated morbid condition	230	254	198	238
Normal or healthy	6	3	7	3
Condition not stated, but presumably normal	29	8	44	8
Lobes of diseased lungs	265	265	249	249

(*a*) In the lobes stated the abscesses formed the prominent anatomical phenomena; abscesses were found in the lobes of other cases in which the general characteristic was hepatization, solidification, etc.

Apoplectic extravasations or infarctions were reported in cases 65, 100 and 112.

Gangrene of the lung was present in the three cases, 115, 136 and 137; the abscess in case 131 was also said to have been gangrenous.

Tubercle was observed in eighteen of the cases, 141–150 and 27, 84, 95, 96, 110, 125, 138 and 155. The number of these cases might have been increased by drawing on the records of consumption; but in most of those just submitted death resulted from pneumonia in the non-tuberculous portions of the pulmonary tissue.

The extent of the engorgement or solidification of the lung was frequently indicated by a statement of the weight of the organ. In case 69 the left lung weighed ninety-two and a quarter ounces, the maximum recorded; in 24 it weighed seventy-five ounces; in 68 the right lung weighed seventy-three ounces.

The trachea and bronchial tubes were rarely mentioned; in a few instances they were said to have contained mucus, rusty sputa or purulent matter. In case 104 the air-tubes were flooded with pus by the rupture of a pulmonary abscess.

Laryngitis was present in the six cases, 23–27 and 156. In the last-mentioned case syphilitic disease is said to have been present; in 23 and 24 the vocal cords were ulcerated; in 25 laryngotomy was performed on account of tumefaction of the lining membrane; in 26 the epiglottis and epiglottidean folds were much swollen and the mucous membrane of the larynx and trachea of a bright-red color; in 27 laryngitis and pneumonia resulted from exposure at night during intoxication.

Concomitant pleurisy.—In *thirty-eight* of the fifty-one cases in which the right lung alone was affected there was a coincident pleurisy, which in one case involved both sides. In *twenty-one* of the thirty-five cases in which the left lung was alone inflamed there was a coincident pleurisy, which involved both sacs in four of the cases. There was also a coincident pleurisy in *one hundred and thirty-nine* of the two hundred and fourteen cases in which the pneumonia was double, but the pleurisy is reported as having affected both sides in only seventy-six of these cases, one side only in the remaining sixty-three,—the right side in thirty-four, the left in twenty-nine cases.

Pleurisy was thus present in *one hundred and ninety-eight* or 66 per cent. of the three hundred cases, affecting two hundred and seventy-nine of the six hundred pleural sacs; and as the right lung was more frequently the seat of engorgement and exudative processes, so the right pleura participated in the morbid action with greater frequency than the left, the former having been affected in one hundred and fifty-two or 50.7 per cent. of the cases, the latter in one hundred and twenty-seven or 42.3 per cent of the cases. The following tabular statement presents the reported pleural conditions in the two hundred and seventy-nine affected cases:

6 Inflamed;			6
186 adherent,	122 adhesions only,		186
	13 with lymph coating on unadherent parts,	5 with lymph only,	
		5 with effused serum,	
		2 with tinted serum,	
		1 with purulent collections;	
	50 with liquid collections,	27 undescribed effusion,	
		11 serous liquid,	
		6 turbid liquid,	
		6 purulent liquid;	
	1 with ecchymosis of the membrane;		
23 lymph-coated,	19 lymph-coated only,		23
	1 with undescribed liquid,		
	1 with serous effusion,		
	1 with purulent collections,		
	1 with ecchymosis of the membranes;		
64 liquid collections,	28 of unstated appearance,		64
	10 serum,		
	13 turbid serum,		
	4 ppurulent serum,		
	6 purulent matter,		
	1 bloody serum,		
	2 blood;		
279	Total number of affected sacs in 300 cases of pneumonia,		279

The adhesions were usually described as recent; but it is probable that in some of the cases tabulated they antedated the fatal pneumonic attack. Interlobar adhesions were frequently found when there was no extensive attachment to the thoracic walls. In case 72 serum became sacculated by incomplete adhesions. A large patch of exuded lymph in case 6 had attained a thickness of half an inch. Liquid collections generally compressed the lung towards the upper and back part of the cavity, but in 130 the right lung was compressed against the anterior wall of the chest by seventy-five ounces of yellowish serum containing flakes of lymph. In 143 the effused liquid caused displacement of the heart. In 119 the purulent collection in the pleural cavity was derived from an abscess in the lower lobe of the right lung. In 71 the left pleura contained two quarts of pus. In 70 the right side was lined with a pyogenic membrane and contained one and a half gallons of pus. The left sac, in 139, was filled with purulent serum, the lung having been destroyed. In 38 and 140 the right pleural cavities were distended with purulent matter, the quantity in the latter having been recorded as seventy ounces. Bloody serum filled the right pleural sac in case 2. Hemorrhage into the pleura was the immediate cause of death in 114 and 115; five quarts were extravasated into the left cavity in the former, in the latter the thorax is said to have been full of blood. In 137 a large abscess containing a pint of pus was found *under* the parietal pleura, extending to the first lumbar vertebra.

The PERICARDIUM is mentioned in sixty of the recorded cases, in three of which it is said to have been normal or healthy. In twenty-five nothing is noted save the presence of a small and probably normal quantity of pericardial liquid. In the thirty-two cases, 70–96, 55, 104, 110, 125 and 135, an increased quantity or change in the quality of the contained liquid, with or without adhesion or exudation of lymph, gave evidence of inflammatory or other morbid conditions. In *twelve* of these cases there was much effusion: In 76 and 91, six ounces; in 55, 75, 77 and 84, eight ounces; in 74, ten ounces; in 110, a pint, and in 83 a large quantity; in 125 the pericardium was reported full of fluid; in 71 distended, and in 94 the quantity of the effused liquid is not stated. In 55 the effusion may have been of a passive character; the patient was greatly prostrated and died comatose probably from a similar effusion into the cranial cavity. In some of the other cases the excess of pericardial liquid may have originated in this manner, but in the greater number the presence of turbidity from flakes of lymph or the association of a villous, roughened or reticulated condition of the serous surface attested its inflammatory character; in 76 and 91 the surface was villous; in 84 thickened; in 74, 75 and 77 reticulated, and in 71 thickly coated with lymph. In *three* of the cases the liquid in the sac was of an unusual quality: In 92 it consisted of bloody serum; in 86 of liquid having the color of mulberry juice, and in 135 of purulent matter derived from a pulmonary abscess. In *nine* cases, 70, 73, 78, 80, 82, 85, 87, 88 and 104, the pericardial lining was thickened and roughened by exuded lymph without adhesion and with little effusion. In most of these the surface of the heart is specially mentioned as affected; but in 80 the lymph-coating is said to have been present on the parietal as well as the visceral surface; in 89 the lymph was disposed in small patches. Adhesions were found in *four* cases: In 95 the pericardium adhered to the heart; in 72 the adhesion did not involve the apex; in 89, on the contrary, the apex was attached to the sac by a narrow band; in 90 the connection was effected by stringy deposits. Of the *four* remaining cases the pericardium is said to have been inflamed in 79 and 81; to have presented dark-purple spots and old adhesions in 93, and tubercular granules in 96.

The ENDOCARDIUM was seldom mentioned in these cases of pericardial implication; in 77 it is said to have been unchanged; but there were evidences of antecedent inflammation in 93 and of recent inflammation in 82.

The CARDIAC SUBSTANCE.—In addition to the cases just mentioned, in which the condition of the heart is

partly understood from statements made in connection with the pericardium, the heart is noted in eighty-eight cases, in fifty-five of which it is said to have been normal. Of the remaining thirty-three it was flabby in *thirteen*, in three of which it was soft, in one fatty, in one pale, in one atrophied and in one enlarged. It was large in *seven* cases, in one of which it was said to have been soft. It was fatty in *five*, hypertrophied in *one*, small in *one*, pale and thin in *one*, discolored in *one* and displaced in *one*. In *two* cases calcareous deposits were found in the valves, and in *one*—(*Specimen* 336, Army Medical Museum)—a cauliflower excrescence was found in the left ventricle attached to the thickened aortic valves.

The CONTENTS OF THE HEART were noted in ninety-one cases. Fibrinous clots were found in *fifty-four:* In the cavities of both sides in ten cases; of the right side in fourteen and of the left side in two cases; in twenty-eight the chambers containing the clots were not particularized. Mixed clots were recorded in *eight* cases; in three on both sides, in one on the right and in another on the left; in three cases the side was not specified. *Two* cases had soft clots; in the right cavities in one case, the cavities unspecified in the other. Black clots were found in *seven* cases, the location in six being unrecorded and in one on the left side. Undescribed clots were found in *seventeen* cases; in the right side in five and in both sides in three cases, while in nine the containing chambers were not recorded. The heart was said to have been full of blood in *one* case, of fluid blood in a *second*, and of black blood in a *third*.

The condition of the LIVER was reported in *one hundred and sixty* cases, in fifty-four of which it was healthy or normal. Of the remaining one hundred and six cases it was said to have been large or enlarged in *fifty-nine;* in six of these it was also congested, in six soft, in three pale, and in four fatty. Of the remaining forty-seven cases it was described as engorged in *one*, congested in *nine*, inflamed in *one*, adherent in *one*, covered with false membranes in *one*, pale in *five*, fatty in *eleven*, soft in *six*, hard and gray in *one*, mottled in *two*, bronzed in *one*, cirrhosed in *three*, small and waxy in *one*, and in *one*, case 112, there were fibrinous masses on the surface of the organ extending into its glandular tissue. Abscesses were found in the *three* remaining cases; in one, which has not been submitted, the purulent deposits were small; in another, 102, the abscess had discharged its contents into the peritoneal cavity, and in the third, 120, abscesses in the liver and lungs were consecutive to the cerebral extension of tympanic disease. The weight of the liver was noted in thirty-seven cases, the average amounting to 71.6 ounces,—the maximum, nearly eight pounds, in case 134, the minimum, 28.5 ounces, in an unsubmitted case.

The SPLEEN was the subject of report in *one hundred and forty-one* cases, in forty-one of which it was said to have been healthy. Of the remaining one hundred cases it was reported large or enlarged in *seventy-three*,—in one of these it was pale; in one of a dark-mahogany color; in five congested; in ten softened, and in ten pulpy and almost pultaceous. Of the *twenty-seven* remaining cases two were anæmic; seven small, one of which was of a chocolate color; one flabby; one congested; twelve softened; two pulpy; one, case 104, broken down and infiltrated with pus, and one tuberculous. The weight of the spleen was recorded in fifty-three cases, the average being 12.8 ounces. The maximum weight, two and a half pounds, was noted in case 47; in 44 the congested organ is said to have been five times larger than normal; in 150 it weighed nearly two pounds. The minimum weight, 3.5 ounces, is recorded in 95.

The condition of the PANCREAS was recorded in thirty-five cases: normal in thirty-two; whitish in one; congested in one, and large in one.

The KIDNEYS were noted as healthy in seventy-six of one hundred and twenty-three cases in which their condition appears to have been observed. Of the remaining forty-seven cases the kidneys were enlarged in *seventeen*, in seven of which they were said to have been also fatty, in two congested and in one, case 61, softened and much congested. In *twenty* cases they were reported congested; in *five* fatty; in *one* granular; pus was found in the pelvis in *one* case; abscesses were noted in *two* cases—in one, not submitted, the abscess, about the size of a hulled walnut, occupied the upper part of the left kidney, the right being unaffected; in the other, case 129, both glands were degenerated and contained many abscesses. In *one* instance, case 40, but one kidney was discovered—on the left side—weighing ten and a half ounces. The weight of the kidneys was reported in twenty-five cases exclusive of case 40. The average weight of the right kidney was 5.9 ounces, of the left 6.3 ounces. The maximum weights were noted in case 80, the right 9 ounces, the left 10 ounces; the minimum weights occurred in an unsubmitted case, the right 3 ounces, the left 3.5 ounces.

The STOMACH was the subject of report in eighty-five cases, in seventy-one of which it was said to have been healthy, while in two the only morbid appearance noted was an unusual distention. The mucous membrane of the remaining twelve cases was said to have been pale in *one*, congested in *four*, injected in *one*, injected, thickened and softened in *one*, inflamed in *two*, discolored in *two* and yellow and soft in *one*.

The condition of the ILEUM or SMALL INTESTINE was stated in one hundred and fifty-five cases. This part of the alimentary canal was healthy in ninety of the cases. Of the remaining sixty-five cases mention is made of the intestine as a whole in *forty-three*, while in *twenty-two* the record restricts the morbid lesions to the lowest division of the tube. Of the forty-three cases in which the small intestine is indicated as the site of diseased conditions, in *five* the gut is said merely to have been distended; in *two* its lining membrane was pale; in *two* softened; in *two* discolored; in *one* hyperæmic; in *twenty* congested; in *two* injected, with thickening and softening in one of them; in *six* inflamed, in one of which, 30, there was pigmentation of the agminated glands, and in another, case 53, an approach to the gangrenous condition; in *two*, 86 and 151, the patches of Peyer were congested or prominent, and in *one*, case 96, the intestine was thought to have been tuberculous. Of the twenty-two cases in which the ileum was specially mentioned its mucous membrane was said to have been congested, injected or inflamed in *eight*, thickened and softened in *one*, punctated like the shaven-beard in *two* and ulcerated in *four* cases, 52, 54, 55 and 99. The agminated glands were mentioned as dark-colored but not elevated in *one;* pigmented in *two;* thickened in *two*, and ulcerated in *two*, 50 and 51.

The condition of the LARGE INTESTINE was noted in one hundred and twenty-nine cases, in eighty-six of which it was normal, in four distended and in two contracted. Of the remaining thirty-seven cases there was injection, congestion or inflammation in *twenty-three*, in three of which, 52, 57 and 146, the mucous membrane was ulcerated. Ulcers were also present in *six* other cases. The membrane was reported thickened and softened in *four* cases, diseased in *one*, pale in *one* and tuberculous in *two*.

The SOLITARY FOLLICLES, without specification of their locality, were recorded as enlarged or disorganized in the six cases 56–60 and 99.

There are evidences of PERITONITIS in six of the cases: The abdominal viscera were more or less agglutinated in 9, 97 and 99; in the two cases, 73 and 85, pleurisy and pericarditis were associated with an inflamed condition of the serous lining of the abdomen—an exudation of recent lymph in one and a degeneration of the exudation into puriform liquid in the other; in 98 the serous membrane was softened and its sac contained purulent matter.

The condition of the BRAIN or its MEMBRANES is stated in sixty-one of the cases. In twenty-one it was normal. The records fail to note the *ante-mortem* condition of the majority of these cases, but in 63, in which the brain was said to have been normal, there was unconsciousness. In forty cases an abnormity was observed. In *thirty* the brain or its membranes were injected or congested, with, in some instances, an effusion of serum in the subarachnoid space or ventricles, and with occasionally a softened condition of the cerebral substance; one of these, 28, was a case of delirium tremens. In the remaining *ten* cases the evidence of encephalic inflammation was more defined: In 29, also a case of delirium tremens, and in 64, the arachnoid was opaque. In 109 there seems to be a flaw in the record,—the interior of the longitudinal sinus is given as the site of the exuded lymph. In 153 the brain, and in 155 its membranes, are said to have been inflamed. Lymph was found on the arachnoid in 154 and on the lining of the lateral ventricles in 156. In 151 the posterior part of the hemispheres was intensely red and the ventricles contained a bloody liquid; in this case delirium was present for ten days before death. In 30 there were patches of pus on the surface of an opaque arachnoid, yet there was no headache or dizziness and the patient was rational to the end; irritability of the stomach was the only peculiar symptom in this case. In case 120 the inflammation of the brain was probably a sequel of disease of the ear.

The PAROTIDS.—The right parotid was swollen in case 111. In two cases the gland was infiltrated with pus—in 112 on the left and in 113 on the right side. In 135 abscesses were observed in the parotid and submaxillary glands.

OCCLUSION OF VEINS.—In case 69 the left common iliac was plugged by a fibrinous clot three inches long.

SECONDARY PNEUMONIAS.—The records contain one hundred and thirty-five cases of lobular pneumonia, consecutive to acute bronchitis or other morbid processes in the lungs of men whose vitality was reduced by previous attacks of disease. One hundred and one of these, or about three-fourths of the whole number, were associated with the specific poison of measles. Cases 1–34 were unconnected with the eruptive fever. Gangrene is recorded in 11. Syphilitic laryngitis was possibly the point of departure of the fatal pneumonia in 33. Death from heart-clot is suggested in 34. Typhoid symptoms appeared in several of these cases with no implication of the small intestine. Delirium sometimes occurred unconnected with observable lesions of the brain; in 26, which was characterized by furious delirium, the brain and its membranes are said to have been healthy. In others, as in 30, cerebral lesions were found after death, although during life the intellect was unaffected.

Broncho-pneumonia with no notable complication,—eleven cases.

CASE 1.—Private Harry C. Meaker, Co. E, 28th Mich.; age 17; admitted Jan. 26, 1865, from regimental hospital with acute bronchitis. Died February 5, of pneumonia. *Post-mortem* examination: Pleuræ normal: lungs filled with blood; trachea and bronchi filled with frothy serum, inflamed, roughened and thickened. Omentum slightly injected; liver enlarged and pale; other organs normal.—*Second Division Hospital, Alexandria, Va.*

CASE 2.—Private Dala Kratzer, Co. F, 70th Ind., was admitted Jan. 19, 1864, with rheumatism, and died February 11, of bronchitis and pulmonary congestion. *Post-mortem* examination: A bony plate two inches in length, one to three-fourths of an inch in breadth, and irregular in outline and thickness, was contained between the layers of the anterior portion of the falx cerebri.—[*Specimen* 314, Med. Sec., Army Medical Museum.] There were moderately strong pleuritic adhesions on the right side; both lungs were congested and ædematous. The pericardium contained about an ounce and a half of serum: the heart was rather flabby and the mitral valves somewhat thickened. The liver, seventy-eight ounces, was fatty: the spleen, nine ounces and a half, contained a firm tumor about the size of a walnut, the interior of which was cheesy with a calcareous admixture and the exterior of a cartilaginous firmness.—[*Specimen* 313.] The kidneys weighed eight ounces each. The stomach and duodenum were much inflamed.—*Surgeon Caleb W. Horner, U. S. V., Hospital No. 1, Nashville, Tenn.*

CASE 3.—Private Marcus L. McVay, Co. D, 174th Ohio: age 40: admitted Feb. 6, 1865, with bronchitis. Died 9th. *Post-mortem* examination: Lungs much inflamed, partly hepatized in their middle and upper portions: air-tubes filled with tough mucus streaked with blood. Heart somewhat hypertrophied: pericardium distended with serum.—*Stanton Hospital, Washington, D. C.*

Case 4.—Private Wm. Christman, Co. G, 67th Pa.: age 20; was admitted May 1, 1864, with gastro-enteritis. Died 11th. *Post-mortem* examination: The brain was soft; its ventricles contained but little serum. The mucous membrane of the larynx and trachea was much congested. The right lung, thirty-seven ounces, presented many spots of lobular pneumonia; the left, thirty-two ounces, contained much bronchial secretion. The heart was flabby, a large fibrinous clot in its right ventricle. The liver was flabby and anæmic; the spleen, eight ounces, was soft and pulpy; the pancreas normal: kidneys flabby. The œsophagus, stomach and large intestine were healthy; the lower part of the ileum congested but not ulcerated.—*Act. Ass't Surgeon H. M. Dean, Lincoln Hospital, Washington, D. C.*

Case 5.—Private Solomon Dunn, Co. K, 2d Colored Cav.; age 60; admitted Aug. 17, 1864, with rheumatism. He recovered, but on account of his age was recommended for discharge. While waiting action on this recommendation he became affected, Jan. 12, 1865, with cough and considerable swelling of the uvula and soft palate. He failed rapidly, refused to take medicine, and died on the 24th. *Post-mortem* examination: Body well developed, muscular and of healthy appearance. The lungs were much congested and infiltrated with blood; the bronchial tubes inflamed. The right ventricle of the heart contained a fibrinous clot and the left dark clots. The liver was large. The other abdominal viscera were normal.—*Act. Ass't Surgeon Otto Shittler, Summit Hospital, Philadelphia, Pa.*

Case 6.—Private Wm. H. Hickson, Co. C, 3d Pa. Heavy Art'y; age 24; admitted Jan. 10, 1865, from Prince street prison with pain in the right hypochondrium and shoulder; tongue pale, furred lightly, white at base; skin yellow; some frontal headache; constipation; pulse 80; slight cough. He says he has had several attacks of inflammation of liver. Died January 27. *Post-mortem* examination: Right lung mostly crepitant, anterior edge of middle lobe quite so, firm, elastic, grayish-yellow color with fine pigmented spots, occasional white spots and some smooth-walled ramifying cavities filled with pus; left lung hardened in places, a cicatrix in the apex and a cavity filled with pus situated deep within the lung.—*Third Division Hospital, Alexandria, Va.*

Case 7.—Wm. H. Hammersly, Co. D, 12th U. S. Art'y; admitted Dec. 30, 1862. Jan. 5, 1863: Fever, cough. 10th: Severe pneumonia of left side. 12th: Subcrepitant râles on both sides; dyspnœa; severe prostration; nervous agitation. 14th: Died. *Post-mortem* examination: Lungs contained many hepatized patches; mucous membrane of bronchial tubes reddened and containing pus; cheesy bronchial glands on left side. Fibrinous clot in left ventricle, becoming black and soft in the pulmonary artery. Liver fatty.—*Lincoln Hospital, Washington, D. C.*

Case 8.—Private Patrick Mahaer, Co. K, 11th N. J.; age 20; was admitted Jan. 13, 1865, with typhoid pneumonia. Dulness with tubular respiration on both sides, specially marked over the lower part of the right lung and the upper part of the left; breathing short and hurried; cough severe; sputa thick, yellow and very offensive; pulse 130 and weak; tongue furred brown, darker in the centre than elsewhere; teeth covered with sordes; skin sallow, hot and dry; bowels relaxed; urine scanty and high-colored. A blister over the chest gave some relief; warm fomentations were afterwards applied. Expectorants, diaphoretics and sustaining measures were employed but without benefit; the patient became delirious, frequently covering his head with the bedclothes and begging not to be shot. He died on the 27th. *Post-mortem* examination: The lower lobe of the right lung was hepatized gray and quite soft. The bronchial tubes generally were dilated and had thickened walls and a brownish-red lining. The heart was normal and contained the usual clots. Liver nutmeg; spleen pale; kidneys pale and fatty.—*Hospital, Alexandria, Va.*

Case 9.—*Post-mortem* examination of J. Karl, a colored soldier, begun thirty minutes after death and ended twenty-four hours after, March 4, 1864: When the heart was opened but little blood flowed out and this could readily be stopped by lifting up the edge of the cut. No trace of deposit was felt in any part of the right chambers or pulmonary artery. When opened next day two small black coagula were found in the pericardium; in the right side was found, in black coagulum, a perfect cast of the chambers and pulmonary artery and of a bubble of air occupying the anterior part; the left ventricle was empty but for a small yellow fat-like clot at its apex and a similar one in its auricle. The lower lobe of the left lung was rather deeply congested, being semi-solid; the upper lobe was crepitant but slightly injected; the surface had bubbles of emphysema scattered under the serous membrane. The right lung was also congested though crepitant; its lower lobe was thoroughly solidified, and in its posterior and lower parts the air-tubes were dilated, filled with pus and surrounded by a dense, non-crepitant, dark-red substance.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

Case 10.—*Post-mortem* examination of Wm. Baker, a colored soldier, March 5, 1864: Heart filled with black coagula. Upper lobe of left lung, with exception of anterior edge, soft, easily crushed, of a gray dirty color and semipurulent; lower lobe, with exception of anterior edge, of a deep liver-color and solid, the minuter bronchial tubes showing white and prominent on its section; the excepted portions of this lung were filled with air but only part of the upper lobe was properly crepitant; its surface had some recent lymph effused on the anterior and outer surfaces. Lower lobe of right lung hepatized but partly crepitant; upper deeply congested; middle injected. Some frothy mucus in primary bronchi.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

Case 11.—Private John Cable, Co. I, 134th Pa.; age 22; admitted Dec. 23, 1862, with a gunshot wound. Died Feb. 1, 1863. *Post-mortem* examination: Right lung, twenty-three ounces and a half; a greenish gangrenous lump one inch and a half long and half an inch thick in the posterior portion surrounded by gray lobules, and, posterior to it, some consolidation: lower lobe solidified posteriorly in one-third of its extent. Left lung, sixteen ounces, solidified in its lower lobe and presenting a creamy, sacculated mass; bronchial tubes much inflamed and containing pus. Fibrinous clot in right and dark clot in left cavities of heart.—*Lincoln Hospital, Washington, D. C.*

Broncho-pneumonia with implication of the pleura,—fifteen cases.

Case 12.—*Post-mortem* examination of Friday Kanawka, a Sandwich Islander, Feb. 25, 1864: Emphysema and yellow effusion in lower part of anterior mediastinum, apparently from right lung; slight effusion in pericardial

cavity; fibrinous clots in both sides of the heart. The left lung had recent adhesions behind; its substance was crepitant but congested, and spotted throughout with a somewhat more solid and deeper red substance, usually, if not always, having in its centre a hypertrophied bronchus filled with yellow puriform fluid: on section these bronchial points protruded from the pulmonary substance. The right lung was crepitant only in the two upper lobes, which were, however, congested and had red, carnified tissue around the enlarged bronchial tubes; the lower lobe was more solidified and its inferior posterior angle and edge had an œdematous, exsanguine and translucent mass of a dirty-greenish color; the bronchial lining was intensely inflamed and its secretion, examined by the microscope, consisted of vast numbers of granules, fat globules—some of which were twice the diameter of a blood-corpuscle—and pus and blood-cells; in one portion, taken from the œdematous part spoken of, an extremely minute nematoid worm was seen.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

Case 13.—*Post-mortem* examination of Levi Parker, a colored soldier, March 23, 1864: The pericardium contained four ounces of fluid: the heart was flabby and distended on the right side by a soft, semi-diaphanous, fat-like clot: the tricuspid valve was covered on its free edges with warty growths, some an inch or more in length; at the bifurcation of the left pulmonary artery was found a smooth lump the size of a filbert and of the same consistence as the warty growths. The lower lobe of the left lung had a tract on its anterior and outer aspect of red hepatization standing inwards toward the root of the lung: the rest of the lung was of a soft texture, crepitant, injected with blood and spotted with black points like the lung of an old person. The right lung was adherent and much flattened against the ribs: its upper end had enlarged bronchial tubes filled with pus; the lung had a deep-red injected appearance with the exception of the anterior edge of the middle lobe, which was more natural.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

Case 14.—Private Francis Demarest, Co. K, 30th (colored) Conn.; died Feb. 18, 1864. *Post-mortem* examination one hour after death: Heart large and distended with fluid blood. Left lung slightly coated with lymph, hepatized in masses about the size of a lemon and elsewhere softened and of a gray color; right lung softened and gray.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

Case 15.—*Post-mortem* examination of James S. Hawley, a colored soldier, commenced twenty minutes after death and finished six hours afterwards, Feb. 20, 1864: The blood was wholly fluid in the right side of the heart. The opening in the ventricle was sewed up so that no blood flowed out, the sternum replaced and the skin sewed over till five hours and a half after, when a uniform red clot, like red current jelly, only opaque, was found in the right ventricle, laminated and adherent by interlacements: the right auricle contained a dark clot, also slightly adherent; the superior cava a black coagulum; the left ventricle a small band of white clot reaching up the aorta and in some places grading off into a red or black coagulum; the left auricle a black coagulum. From some of the pulmonary vessels at the root of the lungs a yellow, semitransparent strip, about two inches long and a quarter to half an inch wide, came out upon cutting through them, but none were observed in the pulmonary substance. Left lung, with recent interlobar adhesions and exudations, congested throughout, showing a rich purple marbling which became vermilion on exposure to the air, bronchially but not vesicularly crepitant and with emphysematous bullæ as large as a walnut on the anterior margin: right lung similarly congested, but with streaks of hepatization in the substance of the middle and lower lobes and softening in the latter posteriorly.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

Case 16.—Private Julius F. Searle, Co. E, 14th Conn.; age 20; died Feb. 22, 1864. *Post-mortem* examination began a quarter of an hour after death and finished six hours thereafter: The pericardium contained over two ounces of serum with a small lymph-deposit: when cut into, warm fluid blood flowed from the right ventricle: no clot was felt: a slimy layer on the posterior wall, when brought up, proved to be light-colored and stringy; most of the escaped blood coagulated within a minute about the heart. At the end of six hours the blood effused into the pericardium had formed two layers, one semi-transparent and dull red, the other of a lighter color. In the right ventricle a dark-red coagulum with indications of a surface layer was found, and on the anterior wall a layer of white clot interlacing with the heart's tissue, identical in appearance with the white clots observed in previous autopsies: the right auricle had a dark-red coagulum also, with indications of surface layering; the superior cava had a black-red coagulum without separation of layers: the left auricle had a narrow white band reaching through the mitral valve and along the aorta as a pencil of compacted coagulum about one-third of an inch in diameter and nearly six inches long, gradually darkening and losing into a mass of dark-red coagulum. The left lung, unadherent, was congested throughout, and when pressed a mass bubbles came from its small bronchial tubes. The right lung was adherent behind: the upper lobe congested: the middle lobe crepitant and gorged: the lower hepatized and softened: the bronchial tubes inflamed and filled with mucus.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

Case 17.—*Post-mortem* examination of George W. Williams, a colored soldier, began about forty-five minutes after death and ended eight hours and a half thereafter, Feb. 24, 1864: Body warm when first opened, and in a state of rigor when opened the second time. Not more than one ounce of fluid in pericardium; no indication of inflammation. The finger, inserted through an incision into the right ventricle, discovered a firm clot on the anterior part. The ear was sewed up. When opened again a rather soft, quite yellow and semitransparent fibrinous clot was found in the apex of the ventricle and along the anterior wall, between the triglochin valves into the auricle and up the conus arteriosus to just above the semilunar valves: with this clot was a mass the size of a large coffee-bean, of firm external texture, which burst on pressure, giving issue to a yellow creamy puriform fluid: a soft black coagulum filled the right auricle and vena cava as far as could be felt. The left lung had its lower lobe slightly adherent, semi-solidified, gray, finely mottled with red: its vessels filled with blood: the bronchial tubes enlarged near the surface, both behind and in front: near the apex was a dark irregular thick-walled cavity the size of a butternut, filled

with a thick dark fluid containing polynucleated pus-cells twice or thrice the size of blood-discs; the upper lobe had on the anterior part of the interlobar fissure a dark spot of blood coagulation; the rest of the lung was congested but crepitant. The right lung had the three lobes congested—the lower one most, the middle one least; a small dark thick-walled cavity in the posterior lower edge adhered to the diaphragm; the upper lobe had on its upper edge a gray-colored spot of shrunken, hardened tissue full of enlarged bronchi filled with pus; two spots of dark solidification, like the one on the opposite side, were on the anterior lower edge of the upper lobe. It was observable that the walls of the minute bronchi were hypertrophied, so that a thin section of lung had a shotty feeling; that their dilatation was greater in the newly congested tissue than in the partly solidified, and that they were there also fuller of pus.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

Case 18.—Private John Harris, Co. B, 8th Conn.; died March 3, 1864. *Post-mortem* examination begun forty-five minutes after death and ended sixteen hours later: When first opened the right side of the heart was distended with fluid blood. Sixteen hours afterwards it was filled with black coagulated blood having a yellow, fat-like, semi-transparent clot on its anterior face in the conus, pulmonary artery and auricle; the left ventricle had a mixed yellow and white clot extending through the mitral valve and up the aorta. The left lung was non-crepitant and œdematous except in the anterior edge just above the fissure, and there was some recent lymph on its anterior face; its upper lobe was marked superficially into purplish blocks about one-third of an inch in diameter by subserous vessels containing a clear fluid only, and its substance was hepatized, some of the parts looking as if they had been decolorized by soaking; the lower lobe was, if anything, more intensely hepatized than the upper; the minute bronchial tubes were of a pale-violet color inside, the larger were slightly injected, none were hypertrophied or prominent on section. The right pleural cavity was distended with effusion; the lung had recent lymph on its inner face and was of a dark-purple color; its upper lobe was solid, dark-brown, somewhat soft but not œdematous, and so closely united to the middle lobe that the fissure was almost obliterated; the lower lobe was softer than the others, but in no part was there any purulent deposit; the minute bronchi seemed largely obliterated but were not hypertrophied nor distended; the mucous membrane of the primary and secondary tubes was inflamed and covered with a sanguinolent fluid which consisted of epithelial cells, fat corpuscles, white blood-discs or pus-cells and very few granules,—in this last respect contrasting markedly with the case of Kanawka,—case 12, *supra*.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

Case 19.—Private Moses Williams, Co. A, 29th (colored) Conn., died Feb. 4, 1864. *Post-mortem* examination: Pericardium filled with fluid, its pleural aspect injected but its serous surface pale; both sides of heart contained mixed white and black clots. The left lung had recent adhesions on its posterior surface, which was blotched with bright-red subserous spots; its substance was pale-red, softened and infiltrated with a reddish muco-purulent liquid; from many of the arteries white clots like those in the heart were drawn out; only its apex and interior and inferior edges crepitated freely. The right lung was slightly adherent but had none of the bright-red subserous markings; its substance was lobularly solidified.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

Case 20.—Private Simon P. Mead, Co. I, 140th Ind.; admitted Feb. 3, 1865, with symptoms of bronchitis. 12th: Expectoration difficult; sputa streaked with blood, tenacious. 14th: Dyspnœa increased. 15th: Small and large crepitation in both lungs. 16th: Involuntary stools; delirium; sputa obstructing air-passages. 17th: Sputa rusty; dyspnœa increased,—died. *Post-mortem* examination: Three pints of serum with lymph-flakes in right pleura; lung adherent, thirty-six ounces and a half, lower lobe hepatized in patches, upper lobes engorged; left lung twenty-nine ounces, somewhat engorged; bronchi of both lungs much congested and filled with tenacious sputa; effusion in pericardium; liver eighty-four ounces; spleen eleven ounces; intestines normal.—*Douglas Hospital, Washington, D. C.*

Case 21.—Samuel Bingham; citizen of Georgia; rebel prisoner; age 66; admitted Feb. 26, 1864, with pulmonary emphysema. Died March 16. *Post-mortem* examination: A quart of serum in each pleural cavity; lower lobe of right lung collapsed and covered with lymph; bronchitis on both sides. Ossific deposits in mitral valve. Liver sixty-one ounces, fatty; spleen six ounces and a half, soft; kidneys normal.—*Hospital No. 1, Nashville, Tenn.*

Case 22.—Serg't William B. Graham, Co. B, 2d U. S. Sharpshooters; age 26; admitted June 19, 1863. He had been absent from his regiment about two months with cough and pain in the left lung. Died 30th. *Post-mortem* examination: Moderate inflammation of tracheal mucous membrane; more aggravated inflammation in the bronchi, extending into the smallest tubes. Recent pneumonia in both lungs, especially in the lower lobes and posteriorly; pulmonary tissue, except at the apices and exterior part of the upper lobes of both lungs, more or less hardened and resembling washed flesh but everywhere pervious to air; air-cells and bronchi filled with abundant clear, viscid, yellowish mucus; lungs attached to the walls of the chest by recent adhesions, thin over the upper lobes but thick and yellowish-white over the lower lobes; pleural sacs contained a moderate quantity of serum. Spleen full-sized and flabby. Lower ileum showing moderate diffused inflammation in irregular patches, with slight thickening of a few of the lower patches of Peyer; slight diffused inflammation in the colon. Other organs apparently normal.—*Act. Ass't Surgeon J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 23.—Private James W. Bates, Co. F, 25th N. Y. Cav.; age 53; was admitted Dec. 5, 1864, with acute bronchitis. Counter-irritants, expectorants and stimulants were employed. He died on the 18th. *Post-mortem* examination: Body well developed. The trachea and larynx contained a quantity of frothy rust-colored sputa. There were slight pleuritic adhesions on both sides and each cavity contained about an ounce of thin liquid. Both lungs were greatly congested; on section a large quantity of frothy rust-colored fluid exuded, but no portion of either lung sank in water; the right lung weighed fifty-two ounces, the left twenty-eight and a half. The left cavities of the heart contained small fibrinous clots. The liver was considerably congested and weighed fifty-three ounces and a half; the spleen seven ounces. There were cysts in both kidneys; the pelves were distended and the ureters enlarged

to about half an inch in diameter. The intestines were normal. [*Specimens* 455 and 456, A. M. M., are from this case, and show the enlargement of the pelves and distention of the ureters, together with the cysts, the largest of which is about the size of a shellbark.]—*Act. Ass't Surgeon H. M. Dean, Lincoln Hospital, Washington, D. C.*

Case 24.—Serg't Grover B. Wixom, Co. G, 5th Mich. Cav.; age 35; admitted March 25, 1864, with typhoid pneumonia. Died 26th. *Post-mortem* examination: Right lung, thirty-one ounces, with old adhesions and lobular pneumonia scattered throughout; left lung, forty-five ounces, with recent adhesions, hepatization of upper lobe and upper part of lower lobe, and much congestion of the remainder of the lung. Epiglottis vascular and œdematous; trachea and bronchial tubes congested.—*Lincoln Hospital, Washington, D. C.*

Case 25.—Private David H. Porter, Co. G, 8th Tenn.; age 20; a man of robust and vigorous frame, was admitted Jan. 30, 1865, complaining of a dry hacking cough and severe pain in the left side of the chest. His tongue was coated, pulse small and hard, respiration hurried and painful,—a friction sound was heard over the seat of the pain. Hot fomentations were applied and Dover's powder administered. Free diaphoresis resulted and the pain was relieved. On February 1 he had a dull pain in the left side, with cough and rusty tenacious sputa; crepitation was heard over the affected part; the pulse was bounding and the skin dry. Veratrum viride and ipecacuanha were prescribed with warm fomentations. On the 3d there was marked dulness on percussion, with bronchial respiration over the lower part of the left lung and moist râles over the upper part of the left and whole of the right lung. Ipecacuanha, sweet spirit of nitre and acetate of ammonia were prescribed. Next day the patient became delirious, the countenance livid, respiration hurried and pulse soft and rapid. Stimulants were given, but he died on the 5th. *Post-mortem* examination: The lower lobe of the left lung was hepatized and bound to the parietes by recent adhesions; the bronchial tubes on both sides were inflamed. The other organs were normal.—*Hospital, Alexandria, Va.*

Case 26.—Private Madison T. Sharon, Co. L, 2d Tenn. Cav., was admitted April 10, 1864, with well-marked bronchitis. In a few days the inflammation extended to the lung-substance and the fever assumed a low character; tongue dry; sordes on teeth; low delirium at first, afterwards furious. Died 18th. *Post-mortem* examination: Brain and membranes healthy. Right lung hepatized posteriorly and extravasated blood in pleural cavity; left lung posteriorly slightly inflamed. Liver large but normal. Bowels healthy.—*Hospital No. 8, Nashville, Tenn.*

Broncho-pneumonia with stated cerebral lesions,—six cases.

Case 27.—See case of Private James Hight, Co. D, 23d Ohio, No. 57 of the *post-mortem* records of the paroxysmal fevers, *supra*, page 131. In this case broncho-pneumonia was the immediate cause of death.

Case 28.—Private Austin Vacon, Co. G, 186th N. Y.; admitted for burial Feb. 5, 1865. *Post-mortem* examination: There was a slight opacity in the visceral arachnoid near the vertex; the floor of the fourth ventricle was congested. The left lung, sixteen and a half ounces, was healthy but for a lobulated portion so congested as to be nearly of the specific gravity of water. On the right side the lobes were inter-adherent by means of extensive flakes of lymph; the parietal and diaphragmatic layers were thickly covered with lymph, but there was little effusion into the sac; the lung weighed twenty-nine ounces and inferiorly contained a congested mass, portions of which sank in water. The heart was normal; its right chambers contained a clot. The liver, forty-eight and a half ounces, was light-colored generally, but exhibited dark congestions on its inferior surface; the contents of the gall-bladder were light-colored; the spleen and kidneys were normal in size, the former somewhat congested. The stomach was darkly congested; there were some small ulcers in the ileum; the large intestine was congested in portions. No other lesion was observed.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Case 29.—Samuel Leonnon; age 23; private Co. G, 21st Ill.; admitted March 16, 1865. Pulse quick and weak; respiration hurried; tongue brown and dry; dulness over lower part of left lung. Died 19th. *Post-mortem* examination: Opacity of visceral arachnoid and serum in sac; congested vessels on floor of fourth ventricle. Sero-purulent liquid in pleural sacs; solidified nodulations, surrounded by serous infiltration in right lung; abscess, with caseous puruloid liquid in upper part of left lung and nodules containing pus in other parts. Mixed clots in right cavities of heart; black clots in left cavities. Enlargement of spleen and congestion of ileum and kidneys.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Case 30.—Henry Brockmeyer, private Co. E, 1st Md.; age 44; admitted March 22, 1865, having been sick about three weeks. Dyspnœa; expectoration offensive, puruloid; countenance slightly venous, anxious; pulse frequent and feeble; intellect unaffected; dulness and absence of respiratory murmur over whole of left side. Died suddenly next morning, after making some slight exertion. *Post-mortem* examination: Pia mater congested; cerebrum softened; lining of lateral and fourth ventricles opacified; arborescences and blood-specks one-quarter of a line in diameter in posterior horn of right ventricle; fornix softened; pons and corpora striata congested. Mixed clots, chiefly white, in both sides of heart, extending into vessels. Pleuritic adhesions on both sides; lower lobe of left lung breaking up into a puruloid pulp, upper lobe dark-colored and containing a consolidated nodule; left lung seventy ounces, right twenty-nine; bronchial tubes on both sides reddened. Kidneys congested; albumen in urine. Ileum congested.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Case 31.—Private Sydenham Stahl, Co. C, 11th Md.; admitted April 28, 1865. Died May 12, of capillary bronchitis. *Post-mortem* examination: Indications of congestion of the brain. In the posterior part of the left lung numerous minute nodules resembling miliary tubercles occupied the centre of pulmonary lobules in association with their bronchial tubes, which were dark-purple internally and filled with a bluish-white puruloid liquid; the bronchioles were thickened in several instances and themselves gave rise to a miliary appearance. Mixed clots in both sides of the heart.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Case 32.—Private Stephen M. Smith, Co. A, 30th (colored) Conn. Died Feb. 24, 1864. *Post-mortem* examination: No blood on vertical section of scalp; effusion under arachnoid and lymph-deposits at vertex; hardening and injection of brain; effusion in ventricles and injection of walls; effusion about pons and medulla. Pericardium contained two ounces of serum; right side of heart a well-formed yellow, semitransparent clot; left side a smaller one. Left lung congested but crepitant; right softened, deeply congested and filled with blackish-green points but still somewhat crepitant. Bronchi on both sides intensely inflamed, filled with pus and tubularly enlarged near the pulmonary surface.—*Act. Ass't Surgeon W. C. Minor, Knight Hospital, New Haven, Conn.*

Broncho-pneumonia from syphilis,—one case.

Case 33.—Private Freeman Dwyer, Co. D, 11th Vt.; age 33; admitted Nov. 21, 1864, with gonorrhœa. Furloughed December 26. Returned Jan. 22, 1865. Died March 14, of syphilis. *Post-mortem* examination: Slight circular discolorations on body and limbs. Dura mater at base slightly inflamed; small serous effusion in ventricles. Nares and pharynx normal; glottis œdematous; mucous membrane of larynx and trachea thickened and inflamed, this condition extending into the bronchioles, where were some small gangrenous patches. Right lung, thirty ounces, hepatized gray except in a small portion of the upper lobe; left lung, twenty ounces, hepatized red in adjacent portions of each lobe. Mucous membrane of œsophagus inflamed, ulcerated in patches, gangrenous in its lower part; cardiac end of stomach somewhat inflamed; ileum congested and ulcerated; mesenteric glands and large intestine healthy. Liver, spleen and kidneys enlarged.—*Lincoln Hospital, Washington, D. C.*

Broncho-pneumonia—death from heart-clot?—one case.

Case 34.—Private George Washington (Indian), Co. L, 9th Kans. Cav.; age 30; admitted Feb. 9, 1864, with acute bronchitis. The heart-sounds were indistinct and there was no radial or temporal pulse; appetite good. After a few days the sputa became opaque and viscid and the breathing difficult. On the 25th the heart-sounds could not be heard at the præcordia. He died next day. *Post-mortem* examination: Pleuræ inflamed, thickened and adherent; three ounces of serum in left cavity; scattered patches of hepatization in both lungs, large and small bronchial tubes filled with a milky fluid. Heart enlarged and flabby; its right ventricle distended with coagulated blood and a large clot of grayish color and firm consistency, interwoven with the musculi pectinati, passing through the auriculo-ventricular opening into the ventricle, filling one-third of its cavity, interdigitating firmly with its fleshy columns and thence passing into the artery; walls of the right side of heart much thinned and dilated; a small clot in the left ventricle similar to that on the right side, but not so intimately connected with the fleshy columns, extending more than twelve inches along the aorta, where it gradually tapered to a point and at the arch subdividing and passing into the large vessels there originating.—*Hospital, Fort Scott, Kansas.*

Seventy-one cases associated with the specific poison of measles, presenting little of interest beyond a specification of the appearance and locality of the affected parts of the lung.

Case 35.—Private James Acles, Co. I, 140th Ind.; age 15; was admitted Feb. 1, 1865, with measles. The eruption did not appear. Death took place on the 7th. *Post-mortem* examination: Hepatization of the middle and lower lobes of the right and lower lobe of the left lung. Heart normal.—*Stanton Hospital, Washington, D. C.*

Case 36.—Private Allen Rinehart, Co. K, 21st Ky., was admitted March 14, 1864, with measles. Pneumonia set in on the 26th, and death took place on the 31st. *Post-mortem* examination: There was some effusion beneath the cerebral membranes. The upper lobe of the left lung was hepatized gray and the pleural cavity contained much effused liquid; the upper part of the right lung was hepatized red, the lower part congested. The pericardium contained three ounces of serum. The kidneys were normal.—*Hospital No. 8, Nashville, Tenn.*

Case 37.—Private Robert Nelson, Co. K, Gunter's Ark. Reg't, died suddenly in barracks during the night, Dec. 9, 1864. He had recently been under treatment for measles. *Post-mortem* examination: Skin purplish; body stout and muscular. Three ounces of bloody serum in the membranes of the brain; many puncta vasculosa; red hepatization, with adhesion of the posterior portion of the right lung; congestion of the left lung, with strong adhesions to the intercostal spaces; large fibrinous clots in the right side of the heart; enlargement and softening of the liver.—*Act. Ass't Surgeon J. E. Brooke, Rock Island Hospital, Ill.*

Case 38.—Private Jacob Brunor, Co. C, 51st Pa.; age 18; was admitted April 9, 1865, with measles. Pneumonia and jaundice appeared on May 16, and death occurred on the 20th. *Post-mortem* examination: The pleural surfaces were adherent; the left lung hepatized; the middle and lower lobes of the right congested. The liver was congested; the spleen enlarged and softened. All the liquids of the body were yellowish.—*Third Division Hospital, Alexandria, Va.*

Case 39.—Private Thomas Yarnel, Co. I, 4th Tenn. Cav.; admitted April 10, 1864, with acute bronchitis. On the 13th, when the eruption of measles appeared, the patient had cough, labored breathing and moist râles on both sides of the chest. Two days later the eruption faded and shortly after the tongue became dry and cracked and the pulse feeble. On the 18th respiration was frequent and the lips and finger-nails bluish. Some time before death, on the evening of this day, the tongue became so swollen as to prevent closure of the mouth; it was incised on both sides and bled profusely. *Post-mortem* examination: The left pleural cavity contained much serum; the upper lobe of the lung was congested, the lower lobe hepatized red; the right cavity and lung were similarly affected but in a less degree. The tongue was flabby; the mucous membrane of the larynx and epiglottis much congested. The abdominal viscera were normal.—*Hospital No. 8, Nashville, Tenn.*

Case 40.—Private Henry Blotkamp, Co. C, 152d Ind.; age 17: was admitted March 22, 1865, with pleuro-

pneumonia, occurring after measles. He improved to April 16, when the febrile symptoms became aggravated, leading to a fatal issue on the 22d. *Post-mortem* examination: Body emaciated. The mucous membrane of the larynx and trachea was inflamed and thickened; the left pleural cavity was filled with sero-pus; the upper lobe of the lung was adherent, hepatized and infiltrated with pus and the lower lobe collapsed. The heart was somewhat displaced to the right side. The liver was enlarged and of a pale-chocolate color. The mucous membrane of the ileum was inflamed and thickened; the mesenteric glands enlarged.—*Cumberland Hospital, Md.*

CASE 41.—Edward E. Royce, Co. A, 168th N. Y., was admitted Feb. 8, 1863, with sore throat, cough and aphonia, following measles. He was much prostrated; had high fever, dyspnœa and muco-purulent sputa. He died on the 17th. *Post-mortem* examination: Both lungs were emphysematous and contained scattered small hard nodules; the bronchial mucous membrane was reddened and the bronchioles filled with muco-pus. The heart contained white clots.—*Ladies' Home Hospital, N. Y. City.*

CASE 42.—Private Levi Sandford, Co. C, 10th Tenn. Cav., was admitted Feb. 21, 1864, with measles, and died on the 26th. *Post-mortem* examination: The brain was healthy. The lungs weighed forty-one ounces; the left was adherent and hepatized, the lower lobe of the right hepatized; the bronchial tubes inflamed. The liver was dark-colored; the spleen weighed ten ounces and was very dark, soft and congested. The other organs appeared healthy.—*Act. Ass't Surgeon S. M. Olden, Hospital No.* 19, *Nashville, Tenn.*

CASE 43.—Private John T. Rockwood, Co. A, 4th Mich. Cav.; admitted Feb. 18, 1864, with measles. Died 24th. *Post-mortem* examination: The brain and its membranes were healthy. The lungs were congested and weighed fifty-two ounces. The heart was healthy and contained dark fluid blood in its right cavities. The stomach was injected. The other organs appeared normal.—*Act. Ass't Surgeon K. J. Sample, Hospital No.* 19, *Nashville, Tenn.*

CASE 44.—Private John Hobby, Co. H, 13th Tenn. Cav., was admitted Feb. 6, 1864, with measles, and died on the 23d. *Post-mortem* examination: The veins of the cerebral membranes were engorged. The lungs weighed fifty-one ounces; the left was hepatized; the bronchi inflamed. The heart contained fibrinous clots. The stomach was inflamed; the small intestine inflamed and thickened in patches; the liver and spleen softened but not enlarged; the kidneys and large intestine normal.—*Act. Ass't Surgeon J. E. Marsh, Hospital No.* 19, *Nashville, Tenn.*

CASE 45.—Private J. W. Stuckey, Co. I, 65th Ind., was admitted Feb. 13, 1864, with measles, and died on the 25th. *Post-mortem* examination: The brain and its membranes were normal. The left pleural cavity was lined with pale yellow lymph and contained thirty-six ounces of serum and pus; the left lung was congested and œdematous; together the lungs weighed forty-one ounces. The heart was healthy. The mucous membrane of the stomach was congested. The spleen weighed ten ounces. The other viscera were normal. The blood in the veins was fluid.—*Act. Ass't Surgeon K. J. Sample, Hospital No.* 19, *Nashville, Tenn.*

CASE 46.—Private Thomas J. Murray, Co. F, 9th Tenn. Cav., was admitted Jan. 30, 1864, with measles. During convalescence severe symptoms of pneumonia set in and death took place February 22. No symptom of disease of the kidney was observed during his sickness. *Post-mortem* examination: The brain and its membranes were normal. There were pleuritic adhesions on the left side and exuded lymph on the right. The lungs, forty-five ounces, were hepatized and their bronchial tubes inflamed and filled with pus. The heart was soft and flabby; both auricles contained fibrinous clots. There were some peritoneal adhesions on the left side. The stomach was highly inflamed. The right kidney weighed fourteen ounces and contained in its upper part a large cyst filled with liquid. The other organs appeared normal.—*Act. Ass't Surgeon S. M. Olden, Hospital No.* 19, *Nashville, Tenn.*

CASE 47.—Private William Jones, Co. H, 9th E. Tenn. Cav., was admitted Jan. 29, 1864, with acute bronchitis, following measles. On the 31st typhoid symptoms appeared, and during the last two days of life there was muttering delirium. He died February 7. *Post-mortem* examination: The brain and its membranes were injected. The mucous membrane of the trachea and bronchial tubes was much inflamed. The lungs weighed fifty-one ounces; the left lung was adherent and its upper lobe nearly solid. There were fibrinous clots in the right cavities of the heart. The peritoneal cavity contained four ounces of liquid. The stomach was healthy; the mucous lining of the intestines, small and large, was inflamed. The other viscera were normal. The blood in the veins was fluid.—*Act. Ass't Surgeon Wm. Stemmerman, Hospital No.* 19, *Nashville, Tenn.*

CASE 48.—Private George Clammond, Co. C, 1st E. Tenn. Cav., was admitted Feb. 14, 1864, with measles. Typhoid symptoms supervened and death took place on the 22d. *Post-mortem* examination: The brain and its membranes were congested. The lungs weighed forty-five ounces; their bronchial tubes were inflamed. The heart contained a fibrinous clot. The cæcum was inflamed. The other viscera appeared healthy. The blood in the veins was fluid.—*Act. Ass't Surgeon Geo. W. Roberts, Hospital No.* 19, *Nashville, Tenn.*

CASE 49.—Private James H. Mallow, Co. H, 31st Mo., was admitted Feb. 26, 1864, with measles. He was unable to speak; the surface of his body was of a bluish-purple color. He died twelve hours after admission. *Post-mortem* examination: The brain was healthy. The lungs weighed forty-six ounces and presented general bronchitis and pneumonia of the left lower lobe. The stomach was inflamed and thickened; the small intestine slightly reddened throughout, the lower portion of the large intestine inflamed but not ulcerated. The liver weighed sixty-seven ounces; the spleen twenty-six ounces; the kidneys twelve ounces. The blood was fluid.—*Act. Ass't Surgeon S. M. Olden, Hospital No.* 19, *Nashville, Tenn.*

CASE 50.—Private John B. Talbot, Co. H, 6th Mich Cav.; age 23; admitted Feb. 13, 1864, with pleuro-pneumonia, following measles. Died 29th. *Post-mortem* examination: The lower lobe of the right lung was hepatized red and presented on section a number of small superficial abscesses. [*Specimen* 345, Med. Sec., Army Medical Museum.] The pleura was thickened. The kidneys were fatty.—*Surgeon L. Bentley, U. S. Vols., Third Division Hospital, Alexandria, Va.*

CASE 51.—Private William H. Stalker, Co. I, 61st N. Y., was admitted April 20, 1864, with measles, and died May 3. *Post-mortem* examination: Right lung adherent and hepatized, its upper lobe infiltrated with pus: left lung, heart and abdominal viscera normal.—*Act. Ass't Surgeon Jas. D. Linton, Harewood Hospital, Washington, D. C.*

CASE 52.—Private Daniel Speiser, Co. G, 39th Ill., was admitted April 4, 1864, with measles, and died on the 14th. *Post-mortem* examination: Right lung hepatized gray; left much congested; liver and kidneys healthy; spleen congested, weighing thirteen ounces.—*Act. Ass't Surgeon C. W. Fillmore, Harewood Hospital, Washington, D. C.*

CASE 53.—Private Stephen Keach, Co. A, 10th Md.; age 20; was admitted March 24, 1864, with measles, and died April 5. *Post-mortem* examination: Both lungs were in the third stage of pneumonia; the pleural sacs contained effusion and the pericardium three ounces of liquid.—*Act. Ass't Surgeon B. B. Miles, Jarvis Hospital, Baltimore, Md.*

CASE 54.—Private G. W. Tillett, Co. L, 1st Conn. Cav.; age 28; admitted Feb. 14, 1864, with double pneumonia consecutive to measles. Died 21st. *Post-mortem* examination: The right lung was softened and the left infiltrated with fetid matter. The pericardium contained two ounces of serum and the ventricles of the heart fibrinous clots. The liver was natural; the gall-bladder empty.—*Act. Ass't Surgeon B. B. Miles, Jarvis Hospital, Baltimore, Md.*

CASE 55.—Private David J. French, Co. H, 152d Ind.; age 16; was admitted March 22, 1865, with measles. The eruption was well marked and the patient's face so swollen that he could scarcely open his eyes; respiration hurried, gasping; pulse 120. He died on the 27th. *Post-mortem* examination: The upper lobe of the right lung was congested, the middle lobe and portions of the lower lobe hepatized; the lower border of the upper lobe and the whole of the lower lobe of the left lung were also hepatized. The liver and spleen were large and congested.—*Act. Ass't Surgeon Thos. R. Clement, Cumberland Hospital, Md.*

CASE 56.—Corp'l William Little, Co. E, 31st Me.; age 18; was admitted May 7, 1864, with pleuro-pneumonia. He had been treated in the Wolfe street hospital, Alexandria, Va., from April 27 as a case of measles. On admission he was delirious and very restless; his skin hot and dry, tongue dry and covered with a brownish coat; teeth covered with sordes; he had cough, dyspnœa and a profuse expectoration of dark-colored muco-purulent matter. The dyspnœa increased and the surface of the body became bluish. Death occurred on the 8th. *Post-mortem* examination: Suggillation posteriorly and discoloration in each iliac fossa. The left pleural cavity contained twenty ounces of serum mixed with lymph; the lungs were much congested posteriorly, portions of their tissue being heavier than water; there was a small abscess in the lower lobe of the left lung. The heart, liver, kidneys and intestines were apparently healthy.—*Act. Ass't Surgeon Charles Carter, Turner's Lane Hospital, Philadelphia, Pa.*

CASE 57.—J. H. Mathews, Government employé; age 58; was admitted March 30, 1864, with measles, the eruption just appearing. Next day the patient was quite hoarse and had cough with mucous expectoration; the eruption was well marked. He became nostalgic on the 8th, his cough troublesome, expectoration muco-purulent, pulse frequent and feeble and tongue clean and red. Next day the tongue was dry and brown, and there was a good deal of febrile excitement with diarrhœa. Death took place on the 13th. *Post-mortem* examination: The cerebral membranes were congested and contained a slight effusion, but the ventricles were empty. The right pleural cavity contained fourteen ounces of sero-fibrinous liquid; the right lung was congested generally and hepatized in its upper lobe: the parenchyma of the left lung was healthy; the mucous membrane of the bronchial tubes was congested and thickened. The heart was normal. The mucous membrane of the colon was congested; the other abdominal viscera normal.—*Surgeon Francis Salter, U. S. Vols., Chattanooga Hospital, Tenn.*

CASE 58.—Private J. T. Moore, Co. F, 98th Ill.; age 19; was admitted March 31, 1864, with measles. The eruption made its appearance on the day before admission; it was not very marked and for some days there was no serious symptom. Diarrhœa set in on April 6, and the patient became sleepy and stupid; he complained of headache, but did not cough much, although crepitation was heard over the right lung. Coma supervened next day, and he died in the evening. *Post-mortem* examination: The membranes of the brain were congested. The middle lobe of the right lung was hepatized, as was also the lower part of the upper lobe of the left lung. The mucous membrane of the bronchial tubes was red and thickened. The kidneys were large; the other viscera normal.—*Surgeon Francis Salter, U. S. Vols., Chattanooga Hospital, Tenn.*

CASE 59.—Private Wilford Overly, Co. H, 33d Ohio; age 19; was admitted April 6, 1864, with the eruption of measles present but not well marked. On the 8th the patient had an attack of epistaxis; he had also some diarrhœa and a cough with mucous expectoration. Next day the eruption disappeared, the tongue became dry and cracked and sibilant râles were heard on both sides of the chest. Turpentine emulsion was given every three hours, with beef-tea, chicken broth and arrowroot. On the 12th the mouth was dry, tongue fissured, voice hoarse, pulse 80, respiration 32, the skin bathed in a profuse sweat and the diarrhœa checked. On the 13th the patient was quite nervous; his pulse 104 and feeble; respiration 36. A sponge-bath was prescribed. He was anxious and nervous next day; sibilant râles were heard on the right side and mucous râles on the left; diarrhœa was present; pulse 120; respiration 56, with a rattling in the trachea which could be heard at a distance. Aromatic and alcoholic stimulants were given. Death occurred on the 16th, preceded by great nervousness and anxiety, cold sweats, increased rapidity of breathing and failure of the pulse. *Post-mortem* examination: The membranes of the brain were much congested; there were three patches of effused blood, each as large as a three-cent piece, on the upper surface of the cerebrum, and on the lower surface of the cerebellum a similar patch two inches in diameter; the lateral ventricles contained an ounce of serum. The left lung was compressed by forty-eight ounces of sero-fibrinous fluid and its lower part as well as the lower lobe of the right lung was in a state of red hepatization; the mucous membrane of the bronchial tubes was red and thickened. The heart and abdominal viscera presented nothing abnormal.—*Surgeon Francis Salter, U. S. Vols., Chattanooga Hospital, Tenn.*

CASE 60.—Private Franklin Wallace, Co. H, 12th Tenn. Cav.; age 16; admitted March 28, 1864, with measles. Died April 4. *Post-mortem* examination: There was intense bronchitis on both sides; the right lung weighed thirty ounces, the left twenty-one ounces. The heart was flabby. The large intestine was ulcerated; the other abdominal viscera healthy.—*Hospital No.* 1, *Nashville, Tenn.*

CASE 61.—Private James J. Russell, Co. E, 1st Middle Tenn. Cav.; age 25; was admitted Nov. 16, 1862, with pneumonia consecutive to measles. Pulse small, wiry, 130; respiration hurried and very difficult; lips livid; sputa offensive and tongue pale, soft, flabby and slightly coated; he had frequent watery discharges from the bowels and considerable delirium. Death occurred on the 25th. *Post-mortem* examination: Body moderately emaciated. A large portion of the right lung was hepatized red and gray; the left was much congested; the mucous membrane of the bronchial tubes reddened. The pericardium was extensively adherent to the heart, which was large but otherwise normal; the aorta was dilated and atheromatous. The liver was congested and firm; the gall-bladder filled with bile; the spleen soft and dark; the kidneys large. The stomach contained six ounces of slimy fluid; the duodenum, jejunum and large intestine were normal: the lower portion of the ileum reddened.—*Hospital No.* 6, *Nashville, Tenn.*

CASE 62.—Private John Stanton, Co. D, 1st Tenn. Cav.; age 24; was admitted Oct. 2, 1862, with measles. The attack left him affected with hoarseness, cough, copious expectoration and diarrhœa. He died on the 25th. *Post-mortem* examination: The right lung was hepatized throughout, the left in lobular masses. The colon was much contracted, appearing in its whole length like a cord about three-fourths of an inch in diameter and having its sacculated form entirely obliterated, its coats thickened and its mucous membrane of a dark-chocolate color; it contained liquid fæces of natural appearance.—*Surgeon E. Swift, U. S. A., Hospital No.* 14, *Nashville, Tenn.*

CASE 63.—Private Samuel Armstrong, Co. E, 9th E. Tenn. Cav., was admitted Feb. 1, 1864, with measles. Owing to exposure the eruption disappeared suddenly on the day of admission and bronchial and enteric inflammations were immediately developed. The patient rapidly sank into a typhoid condition and died delirious on the 6th. *Post-mortem* examination: The pia mater was exceedingly congested and the puncta vasculosa in the brain-substance unusually well marked. The lungs weighed forty-one ounces; the upper and posterior portions of both were hepatized and the bronchial tubes filled with a sanio-purulent fluid. The heart contained well-washed fibrinous clots in all its cavities. The mucous membrane of the stomach was engorged with blood; the small intestine much inflamed, the ascending and transverse colon thickened, softened and congested. The solid viscera of the abdomen appeared healthy.—*Act. Ass't Surgeon C. S. Merrill, Hospital No.* 19, *Nashville, Tenn.*

CASE 64.—Private Henry H. Eley, Co. A, 9th E. Tenn. Cav.; admitted Feb. 3, 1864, with measles. Died 22d. *Post-mortem* examination: The brain was somewhat softened and the pia mater injected. Both lungs were extensively adherent; the right lung and the upper lobe of the left were congested and the bronchial tubes inflamed. The spleen weighed nine ounces and the kidneys fourteen. The other organs appeared healthy. The blood was fluid.—*Act. Ass't Surgeon S. M. Olden, Hospital No.* 19, *Nashville, Tenn.*

CASE 65.—Private Thomas Grimes, Co. A, 9th Tenn. Cav., was admitted Jan. 29, 1864, with measles, from which he recovered so far as to be able to be up and about the ward. On February 15 lung symptoms of an aggravated character were developed, and death occurred next day. *Post-mortem* examination: The membranes of the brain were slightly injected. The pleural cavities contained thirty ounces of turbid liquid; the lungs weighed forty-six ounces; the right was hepatized, the left was congested and had an abscess in its upper lobe. Nothing notable was observed in the other organs. The blood was fluid.—*Act. Ass't Surgeon S. M. Olden, Hospital No.* 19, *Nashville, Tenn.*

CASE 66.—Private Jasper Rice, Co. H, 10th E. Tenn. Cav., was admitted Jan. 27, 1864, with measles. Bronchial and enteric inflammation with delirium supervened on the disappearance of the eruption. Death occurred February 8. *Post-mortem* examination: The membranes of the brain were congested and the puncta vasculosa unusually well marked. The lungs were congested and weighed fifty-five ounces; the right was adherent and the lower lobe of the left partially hepatized; the bronchial tubes were much congested, thickened and softened. The heart was healthy. The liver was enlarged and congested, the gall-bladder moderately full; the spleen, nine ounces and a half, was somewhat softened; the kidneys congested; the lining membrane of the ureters injected, thickened and softened; the bladder healthy but containing two ounces of turbid albuminous urine. The mucous membrane of the stomach was injected and thickened, of the lower portion of the ileum much inflamed, of the ascending colon and sigmoid flexure much inflamed and thickened.—*Act. Ass't Surgeon C. S. Merrill, Hospital No.* 19, *Nashville, Tenn.*

CASE 67.—Private Joseph Reed, Co. G, 9th Tenn. Cav., was admitted Feb. 19, 1864, with measles. He was actively delirious most of the time; dyspnœa was a prominent symptom. Death occurred on the 25th. *Post-mortem* examination: The brain was softened and its membranes injected. The lungs weighed fifty-four and a half ounces: the lower lobe of each was hepatized; the pleural surfaces on the right side were adherent; the bronchial tubes inflamed. The cavities of the heart were dilated and their walls thickened; they were filled with fibrinous clots which extended into the large vessels. The mucous membrane of the stomach was reddened; the intestines were healthy. The liver was enlarged, weighing seventy-three ounces, but was considered healthy; the other abdominal viscera were normal.—*Act. Ass't Surgeon S. M. Olden, Hospital No.* 19, *Nashville, Tenn.*

CASE 68.—Private Abraham Rinard, Co. B, 152d Ind.; age 18; was admitted March 23, 1865, with the eruption of measles fading. His tongue was dry and very red; pulse 104, skin dry and harsh, respiration hurried and cough incessant; he was very restless and unable to speak above a whisper. Death occurred April 2. *Post-mortem* examination: The left lung was hepatized and its apex infiltrated with pus; the right was hepatized in its upper lobe and congested and infiltrated below. The pericardium contained three ounces of serum. The stomach and intestines were enormously distended with flatus, but six inches of the descending colon and three inches of the sigmoid flexure were contracted. The right kidney was congested.—*Cumberland Hospital, Md.*

CASE 69.—Private John C. Lang, Co. F, 59th Ill.; age 17; admitted March 27, 1864, with measles. Died April 4. *Post-mortem* examination: Both lungs were intensely congested, the left weighing twenty-six and the right thirty-two ounces. The liver, sixty-seven ounces, seemed healthy; the spleen, eleven ounces, was of a dark-mahogany color. The other viscera were normal.—*Hospital No.* 1, *Nashville, Tenn.*

CASE 70.—Private Stephen Martin, Co. F, 10th Ohio Cav.; age 18; admitted March 1, 1864, with measles. Died 13th. *Post-mortem* examination: There were firm adhesions on the right side, bronchitic inflammation on both sides and gray hepatization of the base of the left lung. The kidneys were slightly enlarged; the other viscera were normal.—*Hospital No.* 1, *Nashville, Tenn.*

CASE 71.—Private Emmanuel Miller, Co. E, 9th Ohio Cav.; age 18; admitted Feb. 22, 1864, with measles. Died April 1. *Post-mortem* examination: The right pleural cavity contained eleven ounces of liquid and the lung was adherent, thickly coated with lymph and hepatized gray; the upper lobe of the left lung was partly hepatized. The liver weighed seventy-three ounces; the spleen eleven and a half ounces; the kidneys six ounces each; the other viscera appeared normal.—*Hospital No.* 1, *Nashville, Tenn.*

CASE 72.—Private James W. Nelson, Co. E, 21st Ohio; age 17; was admitted March 4, 1864, with measles, and died on the 13th. *Post-mortem* examination: Lungs congested and bronchial tubes inflamed. Heart healthy. Liver, sixty-four ounces, infiltrated with fat; spleen seven ounces; right kidney six ounces, left seven and a half ounces.—*Hospital No.* 1, *Nashville, Tenn.*

CASE 73.—Private Benjamin F. Parker, Co. F, 12th Tenn. Cav.; age 20; was admitted March 6, 1864, with measles, and died on the 15th. *Post-mortem* examination: The bronchial tubes were inflamed and the lower parts of both lungs hepatized. The liver weighed sixty-eight ounces; the spleen eleven and a half ounces; the other viscera were normal.—*Hospital No.* 1, *Nashville, Tenn.*

CASE 74.—Private Hornson Penion, Co. C, 10th Tenn. Cav.; age 16; admitted March 2, 1864, with measles. Died 23d. *Post-mortem* examination: There were livid spots on the face, neck and trunk. The right pleural cavity contained thirty ounces of serum and showed other indications of high pleuritic inflammation; the lung was hepatized gray posteriorly. The heart and abdominal viscera were normal.—*Hospital No.* 1, *Nashville, Tenn.*

CASE 75.—Isaac Williamson, Government employé; age 14; was admitted Oct. 26, 1864, with the eruption of measles well out, and affected with whooping-cough which had troubled him for some months. Broncho-pneumonia set in, and death occurred November 5. *Post-mortem* examination: The brain was healthy. The right lung was hepatized throughout, passing into the gray stage in the apex; the lower third of the left lung also was hepatized; the bronchial tubes were inflamed and choked with bloody sputa. The heart and abdominal viscera were healthy.—*Hospital No.* 8, *Nashville, Tenn.*

CASE 76.—Private Peter M. Dowd, Co. B, 113th Ohio; admitted March 2, 1864, with measles. Died 13th. *Post-mortem* examination: The right pleural cavity contained serum; the right lung was hepatized and adherent by recent lymph; the left much congested and slightly adherent. The heart was healthy. The kidneys were congested; the other abdominal viscera were healthy.—*Hospital No.* 8, *Nashville, Tenn.*

CASE 77.—Private George M. Higgins, Co. H, 12th Tenn. Cav.; age 18; was admitted March 6, 1864, with measles, and died on the 19th. *Post-mortem* examination: There were many large livid spots on the face, neck and trunk. The bronchial tubes on both sides were much inflamed; the right lung was congested posteriorly; the left was hepatized red and largely adherent by recent lymph; the pleural cavity was distended with seventy-seven ounces of bloody serum. The pericardium contained four ounces of serum. The peritoneum was somewhat congested; the liver weighed seventy-five ounces; the other viscera were normal.—*Hospital No.* 1, *Nashville, Tenn.*

CASE 78.—Private Russell Hubbard, Co. F, 2d Mass.; admitted March 6, 1863, with pneumonia following measles. He was treated at first with one-eighth of a grain of tartar emetic hourly and afterwards with calomel, opium and ipecacuanha, with counter-irritation and nutritious diet. He died April 1. *Post-mortem* examination: The right pleural surfaces were adherent in front and laterally; the sac contained a pint of turbid serum; the middle and lower lobes of the lung were in the third stage of inflammation; the mucous coat of the bronchial tubes was reddened and thickened. The pericardium contained six ounces of serum.—*Third Division Hospital, Alexandria, Va.*

CASE 79.—Private Robert N. Peeples, Co. D, 9th Pa. Cav.; age 18; was admitted March 21, 1864, with measles. He was treated with spirit of nitre, acetate of ammonia, ipecacuanha and morphia, with counter-irritation, milk-punch and extra diet. He died April 2. *Post-mortem* examination: The right pleural sac contained a half pint of serum, the left nearly a pint; the left lung was slightly adherent, its lower lobe hepatized. The pericardium contained an excess of serum. The liver, kidneys and spleen were healthy.—*Third Division Hospital, Alexandria, Va.*

CASE 80.—Private Peter Keiser, Co. K, 29th Ind.; age 23; was admitted March 14, 1864, with measles, and died on the 28th. *Post-mortem* examination: The left pleural sac contained fifty ounces of straw-colored and somewhat purulent serum; the lung was adherent and coated with lymph; its lower lobe was condensed. The right pleura contained thirty ounces of reddish liquid; the lung was much congested. The bronchial glands were enlarged. The pericardium contained six ounces of greenish fluid and the veins of the heart were much distended. The liver was congested; the spleen very large; the kidneys enlarged and granular.—*Hospital No.* 8, *Nashville, Tenn.*

CASE 81.—Private James Colbert, Co. H, 10th Tenn. Cav.; age 18; a convalescent from measles, was admitted March 4, 1864, with cough, accelerated pulse and breathing and lividity of countenance; there was some dulness with sibilant rhonchus over the base of the left lung. He died on the 7th. *Post-mortem* examination: The right lung was hepatized red and universally adherent; the lower lobe of the left lung was hepatized. The other viscera were healthy.—*Hospital No.* 8, *Nashville, Tenn.*

CASE 82.—Private John Clay, Co. G, 9th Mich.; age 21; was admitted Feb. 28, 1864, with erysipelas of the face. He recovered, but was taken with measles followed by pneumonia. Death occurred March 24. *Post-mortem* examination: The left lung was hepatized posteriorly in its lower lobe. The right lung, heart, liver, spleen and kidneys were normal. The intestines were not examined.—*Hospital No. 8, Nashville, Tenn.*

CASE 83.—Private James H. Smith, Co. C, 26th Ill.; age 23; admitted March 2, 1864, with measles. Died 13th. *Post-mortem* examination: There were firm pleuritic adhesions on the right side, hæmothrax on both sides, and gray hepatization at the base of each lung. The heart was healthy; the liver weighed seventy-six ounces, the spleen twenty-four ounces; the kidneys were healthy.—*Hospital No. 1, Nashville, Tenn.*

CASE 84.—Private William A. Fight, Co. D, 104th Ill.; age 26; was admitted March 1, 1864, with measles, and died on the 12th. *Post-mortem* examination: The left lung was hepatized and and the bronchial tubes on both sides were inflamed. The heart weighed thirteen and a half ounces; the liver seventy ounces; the spleen eight ounces; the left kidney seven and a half ounces, the right five and a half.—*Hospital No. 1, Nashville, Tenn.*

CASE 85.—Corp'l David C. Gaye, Co. L, 9th Tenn. Cav.; age 27; was admitted March 19, 1864, with measles, and died on the 21st. *Post-mortem* examination: Both lungs were adherent and much congested at the base and posteriorly; the bronchial tubes were inflamed; the left pleura contained six ounces of lymph. The mucous lining of the small intestine was congested. The other viscera were healthy.—*Hospital No. 1, Nashville, Tenn.*

CASE 86.—Private William Goins, Co. I, 9th Tenn. Cav.; admitted March 20, 1864, with measles. Died 30th. *Post-mortem* examination: There were pleuritic adhesions on both sides; the right lung was hepatized gray in its upper parts and red in its lower lobe; the left lung was hepatized gray in its apex and much engorged below. The heart was healthy. The liver, seventy-eight ounces, was infiltrated with fat; the spleen and kidneys were normal. There were patches of congestion in the lower two-thirds of the ileum and in the cæcum; the colon and rectum were healthy.—*Hospital No. 1, Nashville, Tenn.*

CASE 87.—Private George Hoffman, Co. C, 3d Ohio Cav.; age 19; was admitted March 2, 1864, with measles, and died on the 9th. *Post-mortem* examination: Extensive adhesions in both lungs and red hepatization of the lower lobe of the right lung. The lower ileum and large intestine were much congested; the other viscera appeared healthy.—*Hospital No. 1, Nashville Tenn.*

CASE 88.—Private Alfred J. Kite, Co. C, 9th Tenn. Cav.; age 25; admitted March 15, 1864, with measles. Died 16th. *Post-mortem* examination: The lungs were hepatized red and the bronchial mucous membrane on both sides inflamed. The liver weighed sixty-seven ounces; the spleen sixteen ounces; the kidneys were pale and soft; the other viscera normal.—*Hospital No. 1, Nashville, Tenn.*

CASE 89.—Private John Jeffers, Co. L, 9th Ohio Cav.; age 20; admitted Feb. 22, 1864, with measles. Died 28th. *Post-mortem* examination: The left lung, twenty-nine ounces, was bound by strong adhesions, its upper lobe hepatized gray and its lower lobe congested; the right lung, twelve ounces, was engorged in its upper lobe posteriorly, its bronchial tubes much inflamed. There were large clots in the cavities of the heart. The liver adhered to the diaphragm. The spleen, kidneys, stomach and intestines were healthy.—*Hospital No. 1, Nashville, Tenn.*

CASE 90.—Private George W. Brouse, Co. B, 33d Pa.; age 17; was admitted March 17, 1864, with measles and pleuro-pneumonia. He died April 5. *Post-mortem* examination: The left pleural cavity was filled with serum and the lung compressed, softened and covered with lymph.—*Third Division Hospital, Alexandria, Va.*

CASE 91.—Alfred E. Stephens, Government employé; age 24; admitted March 10, 1864. He was treated on the expectant plan until the 21st, when, as the expectoration was scanty and the breathing laborious, carbonate of ammonia and whiskey-toddy were administered. Died 24th. *Post-mortem* examination: The right pleural cavity contained eight ounces of serum and the lower lobe of the lung was hepatized and adherent; the left lung was slightly adherent, softened and broken down. The liver was enlarged and presented the nutmeg appearance; the spleen normal; the kidneys somewhat enlarged.—*Hospital No. 8, Nashville, Tenn.*

CASE 92.—Private Napoleon Price, Co. D, 13th E. Tenn. Cav., was admitted Feb. 16, 1864, with double bronchitis following measles. He died April 9. Four days before death he became unconscious and had subsultus tendinum. He was treated in sequence with Dover's powder and mixture of potash, mercury with chalk, turpentine enema, carbonate of ammonia, with milk-punch, beef-essence, and a blister to the nape of the neck. *Post-mortem* examination: Body much emaciated. The left lung was congested, except just the lower lobe of the right lung; the remainder of the right lung was hepatized red, passing in parts into the gray stage. The heart was pale and contained a fibrinous clot in its right ventricle. The liver, spleen and left kidney were healthy; the right kidney was slightly inflamed; the ileum congested in patches.—*Hospital No. 8, Nashville, Tenn.*

CASE 93.—Private William Lynch, Co. C, 90th Ohio; age 32; was admitted March 14, 1864, with measles. While convalescing he was attacked with pneumonia and a few days later with pleurisy. He was treated with expectorants, diuretics and warm poultices, followed, in the progress of the case, by carbonate of ammonia and milk-punch. He died on the 29th. *Post-mortem* examination: The left pleura contained thirteen ounces of serum and the lung was hepatized in parts and firmly adherent; the right cavity contained thirty ounces of serum and the lung was covered with organized lymph and hepatized in its middle and lower lobes. The heart was dilated, its left ventricle hypertrophied. The liver was enlarged and of the nutmeg appearance; the spleen and mesenteric glands enlarged; the kidneys healthy.—*Hospital No. 8, Nashville, Tenn.*

CASE 94.—Private William H. Robinson, Co. D, 71st Ohio, was admitted March 14, 1864, with measles. He was taken with pain in the right side on the 25th, and died on the 29th. *Post-mortem* examination: The left lung

was much congested; the right pleural cavity contained a large quantity of serum and the lung was hepatized red and gray. The heart and spleen were healthy; the kidneys congested.—*Hospital No.* 8, *Nashville, Tenn.*

Case 95.—Private James Dyre, Co. C, 12th Tenn. Cav.; age 18; was admitted Feb. 23, 1864, with pneumonia following measles. He died March 3. *Post-mortem* examination: The right lung was hepatized red, passing in parts into gray; the bronchial tubes of the left lung were injected. The heart was normal. The abdominal viscera were not examined.—*Hospital No.* 8, *Nashville, Tenn.*

Case 96.—Private William Davis, Co. D, 192d N. Y.; age 19; was admitted April 5, 1865, with a slight cough, without fever, pain or other symptom. On the 10th he had a chill, followed by febrile action, suffusion of the eyes, cough and constipation. Four days later the eruption of measles appeared on the chest and face. He died on the 20th. *Post-mortem* examination: The left pleural cavity was filled with serum; the left lung was coated with lymph, congested generally and its lower lobe partially hepatized; the right lung was congested; the bronchial tubes of both lungs were filled with muco-pus. The liver was congested.—*Cumberland Hospital, Md.*

Case 97.—Private Edwin B. Awker, Co. G, 193d Ohio; age 18; was admitted March 17, 1865, in feeble condition and with hurried and difficult respiration following an attack of measles. He sank into a typhoid condition, became comatose, and died on the 27th. *Post-mortem* examination: Both lungs hepatized and infiltrated with pus. Heart normal. Liver enlarged; spleen twenty-seven ounces.—*Cumberland Hospital, Md.*

Case 98.—B. L. Hamson, Co. C, 13th Ky.; admitted Feb. 19, 1865, with measles and pneumonia. Died March 11. *Post-mortem* examination: The upper lobes of both lungs were normal, the other parts highly congested. The heart was normal. The stomach, liver, spleen and kidneys were healthy; the middle third of the ileum inflamed.—*Act. Ass't Surgeon J. E. Brooke, Hospital, Rock Island, Ill.*

Case 99.—Private A. K. Willard, Co. A, 8th Me.; age 18; was admitted April 29, 1864, with the eruption of measles just appearing. The mucous membrane of the throat was highly injected, but there was no marked cough and no delirium, although the mind was dull. Pulmonary symptoms became prominent May 1; loud, sonorous and mucous râles were heard all over the chest posteriorly; delirium quickly followed, and the patient died at 2 P. M. *Post-mortem* examination: Body greatly discolored, especially in the dependent parts. The brain was not examined. The lungs were congested. No other abnormal appearance was observed.—*Cuyler Hospital, Philadelphia, Pa.*

Case 100.—Private William Six, Co. D, 174th Ohio; age 18; admitted Feb. 6, 1865, with measles. Died 14th. *Post-mortem* examination: The lungs were congested and firmly adherent; the bronchial tubes filled with brownish-white mucus. The left ventricle of the heart contained a firm clot. The liver was normal; the peritoneal covering of the intestines congested.—*Stanton Hospital, Washington, D. C.*

Case 101.—Private Edward Newton, 5th N. Y. Heavy Art'y; age 19; was admitted March 5, 1864, with measles. He died on the 12th. *Post-mortem* examination: The left pleural sac contained much effusion and the lung was extensively adherent and hepatized. The duodenum was inflamed and there were ulcers in parts of the intestine.—*Third Division Hospital, Alexandria, Va.*

Case 102.—Private James Mallory, Co. A, 36th Ind.; admitted Feb. 19, 1864, with measles. Died 27th. *Post-mortem* examination: The brain was healthy, its membranes engorged with blood. The lungs weighed fifty-four ounces; the bronchial tubes were inflamed to their ultimate ramifications. The heart contained a fibrinous clot. The stomach and large intestine were healthy; the ileum inflamed. The spleen weighed thirteen ounces; the other viscera appeared normal.—*Act. Ass't Surgeon Geo. W. Roberts, Hospital No.* 19, *Nashville, Tenn.*

Case 103.—Private Alfred Vaughn, Co. D, 1st Tenn. Art'y; admitted Feb. 13, 1864, with broncho-pneumonia after measles. Died 26th. *Post-mortem* examination: The membranes of the brain were somewhat injected. The right pleural cavity contained fourteen ounces of liquid; the lungs weighed forty-four ounces; the lower lobe of the left lung was hepatized; the bronchial tubes inflamed throughout. The heart was flabby and contained fibrinous clots. The liver, seventy-three ounces, was soft and mottled with gray; the spleen, nine ounces, was very soft; the other viscera were healthy. The blood was fluid.—*Act. Ass't Surgeon S. M. Olden, Hospital No.* 19, *Nashville, Tenn.*

Case 104.—Private A. Carr, Co. F, 1st Conn. Cav.; age 16; was admitted Jan. 31, 1864, with measles, and died February 8. *Post-mortem* examination: The left lung was congested and the pleural cavity contained three ounces of pus; the right lung was infiltrated with pus. The pericardium contained four ounces of serum. The liver was hypertrophied and soft; the spleen soft and congested.—*Act. Ass't Surgeon B. B. Miles, Jarvis Hospital, Baltimore, Md.*

Case 105.—Private Jacob Maust, Co. K, 116th Pa.; age 20; was admitted March 26, 1864, moribund from pneumonia after measles. He died on the 28th. *Post-mortem* examination: The left pleural cavity contained a pint of serum and the lung was coated with thin pasty lymph, its lower lobe being partly hepatized. [*Specimen* 343, Med. Sec., Army Medical Museum.]—*Surgeon E. Bentley, U. S. Vols., Third Division Hospital, Alexandria, Va.*

Ten cases notable only in having coexisting tubercle.

Case 106.—Private William Wilcox, Co. D, 12th Tenn., was admitted Feb. 28, 1864, with measles, and died March 27. *Post-mortem* examination: The right lung was hepatized, in some parts passing into the gray stage; the upper lobe of the left lung was congested and its apex contained tubercle. The heart was normal. The spleen was somewhat enlarged; the other abdominal viscera healthy.—*Hospital No.* 8, *Nashville, Tenn.*

Case 107.—Corp'l Henry Walker, Co. A, 9th Tenn. Cav., was admitted March 19, 1864, with measles. After the eruption faded cough, on the 30th, became severe and attended with frothy expectoration and mucous râles. On April 3 crepitation was heard over the right lung. Death occurred on the 26th. *Post-mortem* examination: The lungs were

hepatized red, in some parts gray; miliary tubercle was abundant in the apex of each. The heart, spleen and kidneys were healthy; the ileum much congested.—*Hospital No. 8, Nashville, Tenn.*

CASE 108.—Private Daniel C. Powell, Co. H, 4th Iowa, was admitted March 19, 1864, with measles. Pneumonia supervened, and he died April 3. *Post-mortem* examination: Both lungs were adherent to the parietes, hepatized in their lower and filled with tubercle in their upper parts; there was an abscess in the upper lobe of the left lung. The heart, spleen and intestines were healthy; the kidneys somewhat engorged.—*Surgeon H. T. Persons, 1st Wis. Cav., Hospital No. 8, Nashville, Tenn.*

CASE 109.—Private Alfred P. Sisk, Co. H, 12th Tenn. Cav.; age 18; was admitted March 9, 1864, with measles, and died March 17. *Post-mortem* examination: The left lung contained much tubercle; the right lung posteriorly was hepatized in patches; the bronchial tubes on both sides were highly inflamed and filled with muco-pus. The heart was healthy. The liver, ninety-two ounces, was light-yellow; the spleen, nineteen ounces, dark and pulpy; the kidneys healthy.—*Hospital No. 8, Nashville, Tenn.*

CASE 110.—Private William H. Yerks, Co. I, 6th N. Y. Heavy Art'y; age 35; was admitted Feb. 19, 1864, with scrofulous bubo. On March 5 he was attacked with measles. Pleuro-pneumonia supervened and proved fatal on the 23d. *Post-mortem* examination: Larynx and trachea inflamed. Left lung hepatized throughout; right containing unsoftened tubercle in its upper portion.—*Third Division Hospital, Alexandria, Va.*

CASE 111.—Private Lemuel Carmichael, Co. B, 9th E. Tenn. Cav., was admitted Feb. 6, 1864, with pneumonia, following the retrocession of measles. He died on the 14th. *Post-mortem* examination: The membranes of the brain were injected. There were firm adhesions and empyema on the left side; the lungs weighed fifty-one ounces and were inflamed; the left lung was affected generally, the right partially; the apex of the right contained a few small tubercles; the bronchial tubes were inflamed throughout. The right ventricle of the heart contained a large fibrinous clot. The stomach was inflamed and thickened; the small intestine injected, the large intestine inflamed and thickened. The liver was enlarged and softened; the spleen, four ounces, was pale and soft; the kidneys healthy. The blood was fluid.—*Act. Ass't Surgeon S. M. Olden, Hospital No. 19, Nashville, Tenn.*

CASE 112.—Private James S. Weaver, Co. B, 9th E. Tenn. Cav.; admitted Feb. 6, 1864, with measles. Died 14th. *Post-mortem* examination: The brain appeared healthy. The lungs weighed fifty-one ounces; pneumonia was general in both; miliary tubercle was deposited in the right lower lobe; the bronchial tubes were inflamed. The right side of the heart contained clots. The stomach and intestines were dark and injected; the solid viscera dark-colored but otherwise normal. The blood was dark and fluid.—*Act. Ass't Surgeon S. M. Olden, Hospital No. 19, Nashville, Tenn.*

CASE 113.—Private William H. Davis, Co. K, 10th Ohio Cav., was admitted Feb. 9, 1864, with measles, and died on the 16th. *Post-mortem* examination: The membranes of the brain were somewhat injected. The lungs adhered to the costal pleura and were congested and filled with miliary tubercle; the lower lobe of the left lung was hepatized: the right lung contained a cavity; the bronchial tubes were inflamed. The heart was filled with coagula. The stomach was congested; the other viscera normal.—*Act. Ass't Surgeon T. H. Hammond, Hospital No. 19, Nashville, Tenn.*

CASE 114.—Private Henry P. Shoals, Co. I, 1st Conn. Cav.; age 19; admitted Jan. 26, 1864, with measles. Died March 7. *Post-mortem* examination: The right lung was condensed and the pleural sac contained fifteen ounces of serum; the left lung was adherent and hepatized, its apex tuberculous. The pericardium contained four ounces of clear serum. The liver was normal; the spleen soft.—*Act. Ass't Surgeon B. B. Miles, Jarvis Hospital, Baltimore, Md.*

CASE 115.—Private Royal Redick, Co. C, 1st Wis. Cav., was admitted Feb. 21, 1864, with measles, and died on the 26th. *Post-mortem* examination: The brain was much injected and its membranes engorged. There were recent adhesions and twenty-four ounces of straw-colored serum in the right pleural cavity; the lungs weighed forty-eight ounces; both were tuberculous, the right presenting abscesses and the left cretaceous deposits; the bronchial tubes were inflamed. The kidneys were congested; the ileum inflamed; the other organs healthy. The blood in the veins was fluid.—*Act. Ass't Surgeon Geo. W. Roberts, Hospital No. 19, Nashville, Tenn.*

Two cases terminated in gangrene.

CASE 116.—Private Henry Warner, Co. K, 1st Ohio Cav.; age 33; was admitted March 23, 1864, convalescing from measles. Pneumonia supervened, and death took place April 2. *Post-mortem* examination: The left lung was adherent and gangrenous; the right healthy. The spleen and kidneys were healthy.—*Hospital No. 8, Nashville, Tenn.*

CASE 117.—Private John Mullen, Co. H, 6th Mich. Cav.; age 16; was admitted Feb. 13, 1864, with measles. He died on the 25th. *Post-mortem* examination: Right pleural cavity lined with lymph and filled with liquid; circumscribed gangrene of the lower lobe of each lung. Other organs healthy.—*Third Division Hospital, Alexandria, Va.*

Four cases complicated with erysipelas.

CASE 118.—Private David Bland, Co. G, 191st Ohio; age 23; was admitted April 4, 1865, with acute bronchitis after measles. On the 11th erysipelas, which was prevalent at this time, appeared on the face. Death took place on the 14th. *Post-mortem* examination: The mucous membrane of the larynx and trachea was inflamed and thickened; the epiglottis œdematous. The lungs were congested and the bronchial tubes loaded with muco-pus. The liver was congested and friable; the spleen congested and indurated; the mucous membrane of the ileum inflamed, thickened and easily removed.—*Cumberland Hospital, Md.*

CASE 119.—Private W. H. Skuggs, Co. K, 21st Ky.; age 26; admitted March 14, 1864. Erysipelas set in on the 22d, and he died delirious on the 24th. *Post-mortem* examination: The brain was congested. The bronchial tubes were inflamed; the lungs congested and somewhat adherent; each pleural sac was distended with thirty ounces of

liquid. The pericardium contained six ounces of serum. The liver presented the nutmeg appearance; the spleen and kidneys were normal.—*Hospital No. 8, Nashville, Tenn.*

Case 120.—E. C. Taylor, Co. A, 27th Ala., was admitted March 3, 1865, with measles. He was attacked on the 7th with erysipelas of the face, and died on the 10th. *Post-mortem* examination: The tongue was black and fissured, shortened and thickened; the œsophagus reddened and coated with dark patches. The left lung was hepatized red, softened in its upper and posterior portions and tuberculous in its apex; the right lung was engorged. Other organs normal.—*Act. Ass't Surgeon W. Matthews, Hospital, Rock Island, Ill.*

Case 121.—Private Frederick A. Blackman, Co. H, 28th Mich.; age 17; was admitted Jan. 30, 1865, with fever and coryza. The eruption of measles appeared next day, followed on February 2 by pneumonic symptoms in the lower lobe of the right lung and on the 6th by pleurisy on the left side. The fever abated on the 10th, but the area of dulness on the left side of the chest extended as high as the fourth rib. On the 14th erysipelas of the face set in, and on the 18th the patient died. *Post-mortem* examination: The left pleura, which was covered with soft whitish exudation, contained one pint and a half of serum; the lower lobe of the left lung was much engorged; the lower lobe of the right lung hepatized. The other organs were normal.—*Third Division Hospital, Alexandria, Va.*

In four cases inflammation of the brain or its membranes was observed.

Case 122.—Private John Griffith, Co. H, 128th N. Y.; age 16; was admitted April 3, 1864, with measles, and died on the 9th. *Post-mortem* examination: The eruption was faintly visible in some parts of the body. The membranes of the brain gave exit to a quantity of blood and serum; the sinuses were filled with blood; the upper surface of the hemispheres was covered with patches of soft and recent exudation; the puncta vasculosa were marked; a small blood-clot was found beneath the anterior commissure; the lateral ventricles contained a half ounce of serum and the choroid vessels and velum interpositum were congested; a slight recent exudation was observed along the fissure of Sylvius, the vessels of which were congested; the pons Varolii was softened; the cerebellar puncta marked. The lobes of the right lung were interadherent and hepatized gray except in the anterior part of the lower lobe, which was congested; the left lung was adherent to the costal pleura and hepatized in its posterior part; together the lungs weighed seventy ounces. The bronchial glands were enlarged, yellowish and softened; those at the bifurcation of the right primary bronchus were softened into a reddish-brown mass. The mucous membrane of the trachea was bright-red in color. The heart contained dark clots. The liver and spleen were healthy; the kidneys congested. The stomach was congested at its cardiac extremity; the duodenum and jejunum reddened; the ileum and large intestine of a dark port-wine color in patches; the solitary follicles thickened.—*Hospital No. 1, Nashville, Tenn.*

Case 123.—Private Elijah Matosh, Co. B, 130th Ind.; age 37; was admitted March 30, 1864, with measles, and died April 9. *Post-mortem* examination: Some bloody serum was found in the membranes of the brain; a little soft and recent exudation on the upper surface of the hemispheres; many puncta vasculosa; some liquid in the lateral ventricles; congestion of the choroid plexus and velum interpositum; softening of the cerebellum and pons. The anterior border of each lung was adherent to the pericardium; the lungs presented large bluish-brown patches which, when cut into, exuded bloody serum; they weighed fifty-seven ounces. The trachea and bronchi were much congested and the bronchioles filled with purulent liquid; the bronchial glands were enlarged, greenish-gray in color and softened. The heart contained a yellow clot in the right ventricle. The liver and kidneys were congested; the spleen healthy; the ileum and part of the cæcum and rectum darkly congested.—*Hospital No. 1, Nashville, Tenn.*

Case 124.—Private Harvey Bales, Co. G, 9th Tenn. Cav.; a robust man, about 30 years of age; was admitted Jan. 30, 1864, with bronchitis following measles. Head symptoms of a sthenic character soon appeared, and death occurred February 4. *Post-mortem* examination: The membranes of the brain were inflamed, as shown by the presence of coagulable lymph, strawberry-colored, in small quantity in the lateral ventricles and congestion of the choroid plexus. The lungs were congested and weighed sixty-three ounces; the bronchi were inflamed and charged with pus; the apex of the right lung was adherent. The pericardium contained one ounce of bloody serum; the endocardium was stained red and the ventricles filled with fibrinous clots. The mucous coat of the stomach was dark-colored, inflamed and thickened; the intestines healthy. The liver was normal; the spleen weighed nine ounces; the kidneys were congested; the urine normal.—*Act. Ass't Surgeon G. W. Roberts, Hospital No. 19, Nashville, Tenn.*

Case 125.—Private Robert Smith, Co. E, 59th Ind.; age 20; was admitted April 8, 1864, with measles. The eruption had appeared on the 1st and was no longer visible. On the 10th the patient had diarrhœa and cough with mucopurulent expectoration. Low delirium with much prostration was developed on the 12th; the tongue became dry on the tip and middle, red and moist on the edges; the teeth covered with dark sordes; the respiration much accelerated and the pulse ultimately imperceptible. He died comatose on the 16th. *Post-mortem* examination: The membranes of the brain were congested; the pia mater was opaque along the course of the vessels, and there was a slight exudation of fibrin on the surface of the brain. The right pleural cavity contained fourteen ounces of sero-fibrinous fluid and there were some pleuritic adhesions; the upper and middle lobes of the right lung were hepatized red, and towards the apex the upper lobe contained a quantity of cheesy tubercle which was for the most part immediately beneath the pleura, extending only about a quarter of an inch into the parenchyma; the left lung was normal; the mucous membrane of the bronchial tubes was inflamed in both lungs. The stomach was injected in patches and contained about thirty-two ounces of greenish liquid. The other viscera were normal.—*Chattanooga Hospital, Tenn.*

Six doubtfully with typhoid fever.

Case 126.—Private Robert P. Patterson, Co. H, 123d Ind.; age 21; was admitted April 3, 1864, and died on the 9th *Post-mortem* examination: The membranes were readily detached from the brain; the subarachnoid space

contained two ounces of liquid and the lateral ventricles a half ounce; the cerebral veins were injected and the choroid plexus and velum interpositum congested; there were many vascular points in the cerebrum and cerebellum; the gray substance was softened. The lungs weighed fifty-three ounces and were congested posteriorly and hepatized in patches. The larynx and trachea were congested; the bronchi congested and charged with muco-pus; the bronchial glands softened. The right side of the heart contained fibrinous clots. The liver and spleen were healthy; the kidneys congested. The small intestine was congested and its glands thickened.—*Hospital No. 1, Nashville, Tenn.*

Case 127.—Private Jno. H. Robbinson, Co. B, 31st Ky.; age 21; was admitted March 13, 1864, with measles, and died April 10. *Post-mortem* examination: Body emaciated; skin jaundiced, particularly on the face. Lungs collapsed; left lung adherent at base, the lower lobe hepatized and at various points softened and infiltrated with puruloid liquid and the upper lobe congested in its posterior part; right lung congested posteriorly; bronchioles filled with yellow mucus; larynx healthy; trachea slightly congested. Liver much softened and lining membrane of hepatic veins deep-red, nearly purple; spleen normal in size but pale-pink in color. Mucous membrane of small intestine pale and presenting oblong patches of thickened glands at irregular distances as far as the ileocæcal valve, near which the solitary follicles became quite distinct.—*Hospital No. 1, Nashville, Tenn.*

Case 128.—Private John Priest, Co. F, 36th Ohio; age 18; was admitted March 14, 1864, with measles. Diarrhœa supervened on the 20th, with considerable bronchial trouble and hoarseness of voice; but in a day or two the patient improved and was able to be up and about the ward. On April 1 he was obliged to return to bed, and delirium supervened during the night. Cough became troublesome; mucous râles were heard on the left side, and on the 4th, the delirium continuing meanwhile, the pulse was 100 and the respiration 50. Sweet spirit of nitre, paregoric elixir and cyanide of potassium were prescribed, with cold applications to the head. Death occurred on the 7th. *Post-mortem* examination: The membranes of the brain were congested. The left pleural sac contained thirty-two ounces of fluid; the left lung was compressed, carnified and coated with lymph; the right lung was slightly congested. The liver was fatty. The mucous membrane of the stomach was injected; Peyer's patches, near the ileocæcal valve, were enlarged. The remaining viscera were normal.—*Surgeon Francis Salter, U. S. Vols., Chattanooga Hospital, Tenn.*

Case 129.—Private William Sugars, Co. H, 132d Ohio; age 21; was admitted June 15, 1864, with enteritis consecutive to measles. On the 29th the abdomen was tender, the bowels loose and the chest painful on the right side; there was much thirst and the tongue was furred and brown. On July 4 the bowels were less irritable and the cough slight, notwithstanding some dyspnœa. On the morning of the 7th delirium was present but subsided by 11 A. M. At 2.30 P. M. his limbs became suddenly drawn up, his head bent on his shoulders, eyes open and glaring, face turgid and the veins everywhere much engorged. Death followed almost instantly. *Post-mortem* examination: The cerebrum was softened and its vessels somewhat injected. The lower lobe of the right lung was much congested, the middle lobe healthy, the upper lobe hepatized red posteriorly and gray anteriorly; the lower lobe of the left lung was hepatized gray in its posterior and lower part and elsewhere thoroughly engorged, the upper lobe congested posteriorly; the bronchial mucous membrane was much inflamed; the right lung weighed twenty-eight and a half ounces, the left twenty-five ounces. The pericardium contained four ounces of liquid; the heart was flabby; its right ventricle contained a large fibrinous clot extending into the pulmonary artery and its left ventricle a smaller but similar clot. The liver was flabby; the spleen, ten ounces, was soft and pulpy; the solitary follicles were enlarged, and a Peyer's patch just above the ileocæcal valve was somewhat thickened.—*Lincoln Hospital, Washington, D. C.*

Case 130.—Private William A. Rager, Co. B, 13th Pa. Cav.; age 15; was admitted March 23, 1864, with measles. He was treated with sweet spirit of nitre, acetate of ammonia, ipecacuanha, morphia, stimulants, expectorants, opiates occasionally to check diarrhœa, turpentine stupes to the chest and throat, sinapisms to the feet, and warm sponge-bathing followed by brisk hand-rubbing; beef-tea and milk-punch were also given. At times the patient's face became livid during attacks of dyspnœa. He vomited several lumbricoid worms. Death occurred April 4. *Post-mortem* examination: The lungs were emphysematous and the bronchioles filled with secretion. The pericardium contained an excess of liquid and the ventricles large fibrinous clots; Peyer's patches were somewhat thickened. The other organs were healthy. No lumbricoid worms were found.—*Third Division Hospital, Alexandria, Va.*

Case 131.—Private Luther Mitting, Co. H, 28th Mich.; age 19; was admitted Feb. 11, 1865, with measles. The eruption disappeared on the 19th, and next day the patient had much pain in the chest and a cough with copious blood-streaked sputa. On the 23d he had severe diarrhœa, hurried breathing, sordes on the teeth and delirium. He died on the 25th. *Post-mortem* examination: There were no adhesions, but the pleural cavity contained a small quantity of serum; the lungs were small and congested; the posterior part of the lower lobe of the right lung sank in water and a bloody fluid escaped from it on section. There was an excess of serum in the pericardium; the heart contained clots. The peritoneum was thickened; the liver enlarged and congested; the gall-bladder distended. There were patches of congestion in the small intestine and the agminated glands were softened.—*Third Division Hospital, Alexandria, Va.*

Three with laryngitis.

Case 132.—Private Henry Morin, Co. B, 192d Ohio; age 16; was admitted March 31, 1865, with syphilis and pneumonia following measles. He was aphonic, his skin hot, pulse 110, breathing labored. Typhoid symptoms developed April 8, and death occurred on the 15th. *Post-mortem* examination: Larynx and trachea inflamed throughout; epiglottis œdematous; vocal cords thickened. Lower lobe of left lung adherent to costal pleura and diaphragm; right lung congested and infiltrated with pus.—*Act. Ass't Surgeon Sample Ford, Cumberland Hospital, Md.*

Case 133.—Private Charles Arnold, Co. C, 19th Ohio; age 19; was admitted April 5, 1865, with severe dyspnœa, urgent dry cough, hoarseness, small and feeble pulse and copious diarrhœa occurring after measles. He died on the

17th. *Post-mortem* examination: Face and upper part of body livid. The thyroid gland was enlarged and infiltrated with pus; the epiglottis œdematous; the larynx, trachea and bronchi infiltrated, thickened and filled with tenacious mucus and bloody serum. The right lung was coated with lymph and infiltrated with pus; the upper lobe of the left lung was congested but pervious to air, and the lower lobe was hepatized. The liver and spleen were normal. The stomach was congested and presented a large ulcer near the cardiac end; the ileum, near its termination, was inflamed and thickened; the stomach and colon were much distended with air.—*Cumberland Hospital, Md.*

CASE 134.—Private John H. McMichael, Co. K, 5th Pa. Cav.; age 19; was admitted March 11, 1864, with pleurisy and laryngitis consecutive to measles. Hot pediluvia were employed, with cups to the chest and tobacco poultice to the larynx; saline cathartics were followed by wine of ipecacuanha, stimulants and beef-tea. He died on the 23d. *Post-mortem* examination: Larynx and trachea inflamed and filled with tenacious mucus; right lung collapsed and friable, its lower lobe thickly coated with pseudomembrane—[*Specimen* 342, Med. Sec., Army Medical Museum]; left lung slightly congested.—*Surgeon E. Bentley, U. S. Vols., Third Division Hospital, Alexandria, Va.*

One case doubtfully with pericarditis.

CASE 135.—Private Joseph Watts, Co. I, 1st Tenn. Art'y, was admitted Feb. 13, 1864, with severe pneumonia consecutive to measles. Death occurred on the 23d. *Post-mortem* examination: The brain was congested. The lungs were bound by recent adhesions and weighed fifty-eight ounces; the upper lobe of each was hepatized; the bronchial tubes inflamed. The pericardium was adherent over the right auricle; the heart contained a large fibrinous clot in each side. The peritoneum was inflamed and adherent; the stomach and small intestine inflamed and thickened, the upper portion of the large intestine ulcerated. The solid viscera appeared normal.—*Act. Ass't Surgeon S. M. Olden, Hospital No.* 19, *Nashville, Tenn.*

ANALYSIS OF THE POST-MORTEM APPEARANCES IN ONE HUNDRED AND THIRTY-FIVE CASES OF SECONDARY PNEUMONIA.

The following tabulation presents the stated conditions of the LUNGS in the one hundred and thirty-five cases:

	Right lung.		Left lung.	
	Upper lobe.	Lower lobe.	Upper lobe.	Lower lobe.
Congestion or engorgement	32	31	40	34
Hepatization	54	65	43	60
Purulent infiltration	6	6	6	6
Cheesy abscesses			1	1
Gangrene	1	2	1	2
Bronchiectasis	1	1		
Emphysema	1	1	1	1
Collapse	1	2		1
Condensation	2	2	1	2
Compression			2	2
Diseased conditions	98	110	95	109
Normal	3	2	4	3
Not stated	34	23	36	23
Total	135	135	135	135

In accordance with the numbers in this statement the left lung was affected in its upper lobe in 70.4 per cent. of the cases, in its lower lobe in 80.7 per cent.; and the corresponding lobes of the right lung in 72.6 and 81.5 per cent. respectively. The greater liability of the lower lobes to hyperæmic conditions is shown in these cases, as in the lobar series; but the predilection for the right lung, evident in the latter, is not here so strongly marked. Both lungs are, perhaps, equally susceptible to invasion by the products of inflammatory processes in the air-passages. This is shown by the few cases in which one lung is said to have been normal or healthy and the other diseased. In two cases, 82 and 116, the right lung was normal, although in the latter the opposite lung was gangrenous; and in three cases, 51, 57 and 125, the left was normal although the right was hepatized and more or less infiltrated with purulent matter. The lower and posterior portions of each lung were more frequently the site of congestion and lobular solidification than the upper and anterior portions; and where both were affected the diseased conditions were generally more advanced in the former than in the latter situation. Cases 22, 31 and 122 may be indicated among many as illustrating this general law in the distribution of lobular pneumonia. But exceptional instances occurred, as in cases 24, 36, 135 and 129; in the last mentioned the middle lobe of the right lung is said to have been healthy, the lower congested and the upper hepatized, red in its posterior portion and gray anteriorly.

In some of the cases in which the condition of neither of the lungs is specified the existence of pneumonia may be questioned, as in 48, 60 and 102, in which the weight of the lungs is the only evidence of pulmonic disease as contra-distinguished from capillary bronchitis; so also in the emphysema of 130 and the tubercular deposits of 115.

Cases in which the lung or a portion of it is said to have been condensed, collapsed or compressed always presented an associated causative pleurisy, as in 22, in which both lungs were affected; 114 and 134, the right lung; 90 and 128, the left lung; 21, the lower lobe of the right lung, and 40 and 80, the lower lobe of the left lung.

CIRCUMSCRIBED PURULENT COLLECTIONS were rare: The left lung in case 6, the lower lobe of the right lung in 50, the upper lobe of the left in 65 and the lower lobe in 56 presented cavities containing purulent matter. In addition to these, abscesses were found in the tubercular cases 108 and 115; cheesy abscesses were observed in 29 and cheesy tubercle in 125.

TUBERCULAR DEPOSITS are said to have been observed in the twelve cases, 106–115 and 120 and 125. They were confined to the apex in 106 and 107, to the right lower lobe in 112. Abscesses were noted in the left lung in 108 and abscesses and cretefications respectively in the right and left side in 115.

GANGRENE was noted in three cases, forming a mass in the right lung in 11, affecting the left lung in 116 and the lower lobes of both lungs in 117.

The TRACHEA and BRONCHIAL TUBES are mentioned in seventy-five of the cases. They are said to have been vascular in *one*, reddened in *six* and congested in *eight;* in many of these the mucous membrane was regarded as thickened and softened. In *fifty* cases the tubes were recorded as inflamed, in one of which, 33, the lining membrane was gangrenous in patches; in *two* cases, 6 and 8, the tubes were dilated; in *one*, 118, the membrane was thickened and œdematous. In the remaining *seven* cases the contents only of the tubes were noted—secretion in 130, brownish-white mucus in 100, yellow mucus in 127, mucus streaked with blood in 3, a milky fluid in 34, rusty sputa in 23 and muco-purulent matter in 96. In ten of these seventy-five cases the LARYNX participated in the inflammatory action: Cases 4, 23, 24, 33, 39, 40, 110, 118, 126 and 133; in the last-mentioned case the thyroid gland was infiltrated with pus. Besides these the larynx and trachea were, in 132, inflamed, their mucous membrane thickened and œdematous, and in 134 inflamed and full of tenacious mucus.

In a few cases the condition of the BRONCHIAL GLANDS was stated: Caseous in 7, large in 80, enlarged, yellowish and softened in 122, soft, large and of a greenish color in 123 and softened in 126.

Recent inflammation of the PLEURAL MEMBRANES is noted in seventy-five of the cases, or 55.5 per cent. of the total number: In *thirty-two* on both sides; in *twenty* on the right and in *twenty-three* on the left side. The reported conditions were as follows:

	Both sides.	Right side.	Left side.
Adhesion	13	5	6
Effusion of serum, sometimes turbid	7	3	4
Exudation of lymph	1	4	3
Adhesion and effusion	8	5	2
Adhesion and exudation	..	1	..
Exudation and effusion	2	1	5
Sero-purulent collection	1	..	1
Purulent matter	..	..	2
Extravasated blood	..	1	..
	32	20	23
Total of pleuritic complications		75	

Adhesion was frequently mentioned as the only result of the recent pleurisy; but in a number of cases it was associated with an exudation of lymph on the unadherent surfaces, or with an effusion of serum, sometimes turbid from flakes of lymph and occasionally sero-purulent or bloody. Effused liquid was present in the cases already stated as having the lung or a portion of it condensed or compressed. In some instances the character or quantity of the liquid was noted: It was turbid in 56, 57, 59 and 65; sero-purulent in 29 and 40. Each sac contained 30 ounces of liquid in 119 and the left sac 32 ounces in 128; the left sac contained 50 ounces of somewhat purulent serum and the right 30 ounces of reddish serum in case 80, and in case 77 the thoracic cavity contained 77 ounces of bloody serum. Pus is said to have been present in the left cavities in 104 and 111 and extravasated blood in the right pleura of 26.

The condition of the PERICARDIUM was noted in twenty-four of the cases. In twelve the sac contained a small quantity of serosity, insufficient to suggest the likelihood of inflammatory conditions. In most of the cases in which the liquid was abnormal in quantity or quality, or the membrane altered, the pleural membranes were likewise involved. In 78, with coincident pleurisy of the right side, the pericardial liquid measured six ounces; the same quantity was found in 119, with pleuritic effusion on both sides; an excess was noted in 79 and 131 and six ounces of a greenish liquid in 80, in all of which cases both pleural sacs were affected. In 16, in which a normal quantity of pericardial serosity is said to have contained some flakes of lymph, the right lung was adherent. In 77 and 135, in which the peritoneum was involved as well as the pleuræ, the pericardium in the one case contained 4 ounces of serum and in the other was adherent over the right auricle. On the other hand, no mention is made of pleural inflammation in case 3, which had the pericardium distended; in 130, which presented an excess of liquid, or in 124, in which an ounce of bloody serum was reported. The adherent pericardium in 61 evidently antedated the fatal attack.

It will be seen from these statements that decided pericarditis was by no means so frequently associated with secondary pneumonias as with the acute lobar cases. Pleurisy, it is true, was somewhat more common in the lobar pneumonias, but this is insufficient to explain their marked preponderance in well-defined pericarditic complications. In the secondary pneumonias contiguity to the morbid processes in progress in the lungs and pleuræ may be accepted in explanation of the excess of liquid in the pericardial sac; but as the secondary cases did not present in the pericardium the plastic exudations and sero-purulent liquids so commonly observed in the lobar cases, these inflammatory results in the latter must be referred to a more potent influence than contiguity of inflamed tissues.*

* See *infra*, page 805.

The HEART was mentioned in forty-one cases. In twenty-nine of these it was normal or healthy—in one, 61, notwithstanding the existence of extensive adhesions. It was represented as flabby in *five* of the remaining twelve cases, 2, 4, 13, 103 and 129; soft and flabby in *one*, 46; large and flabby in *one*, 34; pale in *one*, 92; hypertrophied in *three*, 3, 67 and 93, and displaced in *one*, 40, by effusion in the left pleural cavity.

The CONTENTS OF THE HEART were noted in forty-five cases. In *five* the heart is said to have contained clots the appearance of which is not stated, in *five* fibrinous clots and in *one* dark clots. Both sides contained fibrinous clots in *ten* and mixed clots in *five*. Fibrinous clots were found in the right side in *nine* in which the contents of the left side were not specified, and in *two* in which the left was occupied by dark clots; mixed clots in the right in *two*, with the opposite side unstated in one and containing dark clots in the other; dark clots in the right in *two*, with fibrinous clots in the left in one and mixed clots in the other; clots of unspecified character in the right in *one* and fluid blood in *another*, in both of which the contents of the left side were unnoted. The chambers of the left side contained fibrinous clots in *two* cases in which the contents of the right side were unrecorded.

The LIVER was the subject of report in ninety cases, in forty-nine of which it was normal. Of the remaining forty-one cases it was reported large in *twelve*, in three of which it was pale or light-yellow in color and in three softened; fatty in *ten*, in one of which it was increased in size; congested in *eleven*, in three of which it was enlarged, and in one friable. It was dark-colored in *two*, soft in *two*, soft and mottled in *one*, flabby in *one*, flabby and anæmic in *one* and adherent to the diaphragm in *one*. Its weight was reported in eighteen instances, the maximum, ninety-two ounces, in 109; the minimum, forty-eight and a half ounces, in 28,—the average seventy-two and one-half ounces.

The SPLEEN was noted in eighty-eight cases, in forty-seven of which it was regarded as normal. Of the remaining forty-one cases it was large in *twenty-four*, in six of which it was soft, in one flabby and in one dark-colored; softened in *seven*, in one of which it was pale, in two dark-colored and in one pulpy; congested in *six*, in one of which it was also large, in one hard and in two soft; pale in *two* cases and dark-colored in *one;* in *one*, case 2, it contained a small cheesy and cretaceous tumor. Its weight was noted in twenty-five cases, the maximum, twenty-seven ounces, in 97; the minimum, four ounces, in 111,—the average, twelve ounces; it weighed twenty-six ounces in 49, twenty-four ounces in 83 and nineteen ounces in 109.

The KIDNEYS were noted in eighty cases, in fifty-four of which they were normal or healthy and in twenty-six altered. They were large in *five* cases, large and granular in *one*, fatty in *two*, flabby in *one*, pale and soft in *one*, dark-colored in *one* and congested in *twelve*, in one of which, 68, the right kidney only was affected. In *one*, 92, the left kidney was healthy, the right inflamed; in *one*, 23, the pelves were distended and the ureters enlarged; and in *one*, 46, a large cyst with liquid contents was found in the right kidney, which weighed fourteen ounces.

The condition of the STOMACH was noted in twenty-six cases, in five of which this organ was said to have been normal and in one distended. Of the remaining twenty cases its mucous lining was reported as injected in *four*, in one of which, 125, it contained thirty-two ounces of a greenish fluid; engorged in *one;* reddened in *one;* congested in *five*, in one of which, 28, it was of a dark color, and in one, 133, it presented a large ulcer near its cardiac extremity; and inflamed in *nine*, in one of which, a syphilitic subject, case 33, it was associated with ulceration and gangrene of the mucous membrane of the œsophagus.

The ILEUM OR SMALL INTESTINE was noted in seventy-six instances, in thirty-nine of which a healthy condition was present, while in one distention was the only abnormity recorded. Of the remaining thirty-six cases the small intestine is the subject of report in twelve, the ileum in twenty-four. The mucous membrane of the small intestine is said to have been reddened in *one* case, 49; injected in *two*, 111 and 112; congested in *three*, 85, 126 and 131, in the second of which the glands were thickened and in the last softened; inflamed in *four*, 44, 47, 63 and 135; ulcerated in *one*, 101, and in *one*, 127, the mucous membrane was pale, although the patches of Peyer and solitary follicles were prominent. Of the twenty-four cases in which the ileum was reported as the site of the lesion its mucous membrane was reddened in *one*, 61; congested generally or in circumscribed patches in *ten*, 4, 27, 29, 30, 86, 87, 92, 107, 122 and 123, in one of which, 122, the membrane was of a dark port-wine color and its solitary follicles thickened; inflamed in *eight*, 22, 40, 66, 98, 102, 115, 118 and 133, in the first of which the patches of Peyer were slightly thickened; ulcerated in *two*, 28 and 33; and in *three* the condition of the glands only was stated, the agminated glands being thickened in 128 and 130, and the solitary follicles much enlarged, with thickening of one of the patches of Peyer near the ileocæcal valve, in 129.

The LARGE INTESTINE was noted in sixty-four of the cases, in forty-four of which it was normal and in two distended. Of the remaining eighteen cases its mucous membrane was injected in *one;* congested in *seven*, 28, 57, 63, 86, 87, 122 and 123,—the congestion forming dark port-wine colored patches, with thickening of the solitary follicles in 122, and affecting the cæcum only in 86; inflamed in *six*, 22, 47, 48, 49, 66 and 111, the cæcum only being implicated in 48; ulcerated in *two*, 60 and 135; pigmented in the sigmoid flexure in *one*, 27, and contracted in *one*, 62, into a thickened unsacculated tube three-quarters of an inch in diameter, lined with a dark chocolate-colored mucosa, but containing liquid fæces of a natural appearance.

The PERITONEUM was congested in 77 and 100, thickened in 131, and adherent in 46 and 135.

The BRAIN and its MEMBRANES appear to have been examined in forty-four of the cases, in eight of which, cases 26, 42, 43, 45, 46, 49, 75 and 112, they were said to have been normal or healthy,—in seven of these cases the symptoms that preceded death are not stated, but in one, 26, a low delirium, which afterwards became furious, is noted in the clinical record. Of the thirty-six cases in which an encephalic abnormity is mentioned, the brain is said to have been soft in *one*, case 4; softened and somewhat injected in *one*, 129, and congested in *three*, 31, 119 and 135. The membranes are said to have been engorged, injected or congested in the *nine* cases, 44, 57, 58, 65, 102, 103, 111,

113 and 128, in one of which, 102, the brain was regarded as healthy. In *one*, case 36, there was effusion under the membranes. The brain and its membranes are said to have been injected or engorged in the *five* cases, 47, 48, 63, 66 and 115; and the pia mater congested, with the brain-substance softened, in the *two* cases 64 and 67. In the remaining *fourteen* cases some details of the encephalic lesions were recorded: In 126 there was congestion and softening of the brain with effusion under the arachnoid; in 37 the puncta vasculosa were marked and the membranes contained three ounces of bloody serum; in 33 there is said to have been a slight inflammation of the dura mater at the base of the brain; in 27 thickening of the membranes at the foramen of Bichat and distention of the ventricles; in 28 and 29 slight opacity of the visceral arachnoid near the vertex and congestion of the floor of the fourth ventricle; in 30 softening of the cerebrum, congestion of the pia mater and of the substance of the pons and corpora striata, and opacity of the lining membrane of the ventricles. Deposits of lymph were noted on the vertex in 32; on the hemispheres, with much congestion and effusion of bloody serum, in 122, 123 and 124; and on the brain and along the track of the vessels in 125. In 59 congestion of the membranes was associated with patches of effused blood under the arachnoid and bloody serum in the ventricles. In case 2 a bony plate two inches in length, one-fourth to three-fourths of an inch in width, and of irregular outline and thickness, was found in the anterior portion of the falx cerebri.

Delirium was present in many of these cases, as in 27, 47, 63, 66, 67, 119, 124, 125, 128 and 129; in the last-mentioned case the patient became rational before death. Coma was present in 58, and typhoid symptoms, which probably imply a low delirium, in 48. In many cases the record is silent as to the symptoms that attended the fatal illness: but in a few, as 29, 57 and 65, no reference was made to cerebral symptoms, although the condition of the patient was briefly described. In 59 great nervousness and anxiety were the only symptoms referrible to a cerebral lesion, and in 30 the intellect was unaffected notwithstanding a marked implication of the brain and its membranes.

Pathology of Pneumonia.—From the most remote and dark ages of medical history the disease now known as lobar pneumonia, although sometimes confounded with other pulmonary and pleuritic affections, has been recognized as an inflammation of the lungs. If any views of the nature of disease were held to be established, that which regarded this disease as an inflammation was certainly one of them. Whatever theory of inflammation prevailed, pneumonia, with its solidification of the pulmonary tissue and its rust-colored tenacious expectoration, was always considered an idiopathic inflammation attended with a constitutional disturbance secondary to, and parallel with, the local affection. It was, in fact, taken as the type of internal parenchymatous inflammations, and the treatment of inflammation, irrespective of locality, was based on the results of experiment and observation in pneumonic cases.

Nevertheless, of late years, there has been a marked tendency on the part of those on the advance-lines of medical thought and inquiry to overturn this time-honored doctrine. The grand impetus given to the germ theory of disease by the investigations of Pasteur, by Davaine's discovery of the etiological relations of a certain bacillus to anthrax, and Obermeier's observations on the spirillum of relapsing fever, has contributed largely to this revolutionary tendency. Friedländer demonstrated the presence of a micrococcus in the croupous exudate. This has been verified by other observers; and it is claimed that cultures of the organism, when injected into the lungs of mice and rabbits, have occasioned pneumonia as it occurs in man, with associated pleurisy and fibrinous pericarditis. Emmerich, by culture experiments, found this particular micrococcus in a foul organic filling between the floors and underlying ceilings of a house in which pneumonia had prevailed.* Some investigators have been so impressed with the results of these inquiries as to deny the existence of a pneumonia resulting from exposure to cold and dampness, insisting on a parasitic origin of the disease, which they regard as a local affection so long as the micrococci do not extend beyond the pulmonary tissues, and as a specific infectious disease when the circulation becomes invaded.†

Meanwhile, certain medical authorities, apparently uninfluenced by the inquiries into the life-history of Friedländer's micrococcus, but biassed chiefly by clinical and general etiological considerations, have concluded that lobar pneumonia is in all instances an acute specific disease analogous to typhoid fever, and that the exudation in the air-cells is the anatomical characteristic of the one, as the affection of the patches of Peyer constitutes that of

* *Fortschritte der Medicin*, Bd. II, 1884, page 153.

† Talamon and Sée, *Des Pneumonies Aigües*, Paris, 1885.

the other. W. H. DRAPER advocated this view in this country in 1866.* JUERGENSEN urged it in his article on Croupous Pneumonia in Ziemssen's Cyclopedia, basing on it the system of treatment which is derived from the following proposition in relation to self-limited diseases: Nature cures, and the only duty of the physician is to maintain life until this cure is affected! Again, in two of the text-books on the Practice of Medicine, published in this country during the year 1884, that of A. L. LOOMIS of New York, and the fifth edition of FLINT's Practice, the doctrine of a specific disease—a pneumonic fever—supersedes that of an acute inflammation with symptomatic fever.

But certain of the arguments seem strained to serve a purpose,—at all events they are not sustained by the medical experiences of the war. Thus, pneumonia is held to be something other than a simple inflammation, since it differs in its seasonal and geographical distribution from bronchitis, which is undoubtedly a simple inflammation. JUERGENSEN gives a diagram based on the admissions for twenty years to the Vienna hospital, showing pneumonia rising to a maximum in April and May, while catarrh of the respiratory organs is represented as falling during those months from a maximum in March. As to the difference in the geographical distribution of pneumonia and the respiratory catarrhs, he considers it unnecessary to say more than that the latter increase in frequency as we progress to higher latitudes, while this is not the case with the former, and that ZIEMSSEN and HIRSCH are in accord on this point. LOOMIS asserts that cold does not influence the prevalence of pneumonia as it would were the disease, like bronchitis, a local inflammation. Wet and cold, according to his statement, increase the frequency of bronchitis, but not that of pneumonia. He gives, however, no statistics to establish this point. FLINT does not dwell on its seasonal difference from bronchitis, but agrees with LOOMIS in asserting the disease to be vastly more frequent in the Southern than in the Northern States. The statistics of the war do not authorize these positive statements. There was, on the contrary, such a general agreement between the prevalence and distribution of catarrhal and pneumonic affections as to suggest that the causes of both were intimately associated with cold and dampness, whether seasonal or climatic. JUERGENSEN states, as one of the arguments which serve to disconnect pneumonia from pleurisy and bronchitis, that the cases of pneumonia in which there has been a previous exposure to cold or other influences of an injurious character are so few that it is hardly possible to regard these influences as exciting causes. Nevertheless, the pneumonias of our camps were invariably attributed to exposure to cold and wet.

But, overlooking the evident weakness of the argument drawn from prevalence, distribution and obscurity of the exciting cause, there are others, derived from the clinical history of the disease, which give plausibility to the doctrine of a pneumonic fever. First: The chill and the access of the pyrexia in advance of the local action are the phenomena of a specific fever. The antecedence of the fever may be denied on the assumption that its very existence presupposes the existence of pneumonic invasion, circumscribed as yet, and difficult of detection by physical exploration, especially when deeply seated in the pulmonary tissue. This cannot be met directly, but it may be met indirectly by the second argument: The want of correspondence between the intensity of the local and general disturbances is inconsistent with the theory of an idiopathic inflammation. Exception may be taken to this on the ground that the accompanying fever is modified by the constitutional state, and that an extension of the disease may be unmarked by a notable aggravation of the febrile disturb-

* Before the New York Academy of Medicine. See its Bulletin, Vol. II, 1862–66, p. 517.

ance, as the system has become unable to sustain a corresponding symptomatic action. This objection may be allowed in the advanced stage of the disease, but it cannot hold good in the early period, when the local inflammation has to be assumed in the absence of all signs of its presence except the highly febrile state. If the first proposition—the precedence of the fever, be denied, the second—the want of a correspondence between the local and general symptoms, cannot be assailed. The third and strongest argument in favor of a specific doctrine is found in the characteristic or typical course of the disease to a sudden termination by a crisis while the inflammatory conditions in the lung are at their height.

But although an unknown constitutional cause is claimed for the pyrexia, the local lesions are regarded by these authors as a true inflammation of the lung. None of them doubt the inflammatory character of the local processes. Yet there appears to be every reason for doing so, in view of the well known observations that wounds of the lung and irritants applied to the organ, or inhaled or injected into it—in a word, the ordinary exciting causes of inflammatory action in other tissues—do not induce the local processes in question. These facts have been brought forward by every writer in support of the doctrine that pneumonia is not an idiopathic inflammation, but a specific disease with a local inflammatory lesion. But if they have any meaning at all in this connection they have more than has been claimed for them. They indicate not only that pneumonia is not a local inflammation with a symptomatic fever, but that it is not an inflammation, no matter how it is regarded, whether as a local disease or the local expression of a constitutional state. This appears to be one of the strongest arguments in favor of the doctrine of a specific constitutional affection. Pneumonia is not a local inflammation with a symptomatic pyrexia, because it has been shown by many experiments not to be an inflammation. The fever associated with it must therefore depend on some other cause; but as there is no other local lesion to which it may be attributed, it must be regarded as the result of some impression or influence affecting the system at large,—a fever which, as it is associated with well-developed changes in the lungs, may appropriately be called, as of old, pneumonic or lung fever.

Inflammation is essentially a perversion of the nutrition of a tissue. An increased quantity of blood flows to the affected part, increased exudation and migration of the corpuscular elements take place through the walls of the capillaries and the ordinary processes of the part become intensified:—inflammation is present. In accordance with the nature and duration of the exciting cause and the anatomical characters and relations of the affected tissue, the inflammatory process terminates in one or other of certain well-known ways. But in all this the motive power is the plastic force. The nutritive processes ordinarily carried on in the tissues are stimulated and their results more or less perverted.

But these are neither the conditions nor actions that are present in pneumonia. In a true inflammation of the lungs the capillary system of its nutritive arteries is involved. When those supplying its mucous membrane are implicated, there is a catarrhal inflammation with many secondary developments in the lobules due to peculiarities of structure and anatomical relationship. Peribronchitis, interstitial pneumonia and the conservative thickening of the pulmonary tissue, which circumscribes morbid accumulations, are examples of true pulmonary inflammation. But in pneumonia there is no perversion or modification of the action of the nutritive forces, as these forces are not concerned in the distribution of the blood which constitutes the pneumonic congestion. The close-set capillary net-work on the walls of the intercellular passages and air-cells which becomes surcharged with blood during

the early stage of a lobar pneumonia forms a part of the mechanism of decarbonization and oxygenation. Its function is to expose blood for purification, which, while impure, is incapable of sustaining the nutritive processes. Certain causes induce congestion of this capillary net-work, but these causes are not causes of inflammation, nor is the resulting congestion the arterial congestion which leads to inflammatory consequences. Causes of inflammation affect the capillary system into which the arterial and plastic blood is received for formative and reparative purposes, but in pneumonia the causative influence is felt by the venous blood and the vessels in which it flows.

No doubt the results of the pulmonic congestion are similar to those of an arterial inflammatory hyperæmia in so far as there is a transudation in both instances from the surcharged vessels, and this similarity is heightened by a similarity in the subsequent processes of removal; but it cannot be said that pneumonia is an inflammation modified by the peculiar anatomical characteristics of its site, for the proximate cause of the transudation—the congestion—is, as has been stated, not occasioned by the causes of inflammation, and neither the anatomical nor the physiological domains invaded are those affected in the inflammatory process. The nutritive vessels, the intercellular structures, and the plastic forces operating in and by these are concerned in inflammation;—the pulmonary capillary net-work, the air-cells, which are histologically as much outside of the body as the cutaneous surface, and the process of oxygenation are involved in pneumonia. The pulmonary transudation is, therefore, not a true inflammatory exudation. Sir ANDREW CLARK has observed this. He has pointed out that when recent the pneumonic exudation consists of the elements of a capillary blood-clot, not of an exudation.* These are leucocytes, red-blood discs, hyaline globules and granule cells. The number of blood-discs often exceeds that of the leucocytes, and many of the latter may be proved to be really blood-discs undergoing histological changes. The alveolar walls are pale, not engorged, and their vessels are, many of them, occluded, not distended as in inflammation; the nutritive arterial supply is not involved. He therefore claims that the consolidation is the result of an active congestion in which the unsupported bloodvessels give way and permit, with a slight exudation, the extravasation of all the elements of the blood before the inflammatory process can be completed by cell-proliferation and textural development. He considers it an aborted inflammation: but, if the arguments just submitted are of value, it is not even this, as there has been no inflammation to abort.

The febrile action of pneumonia, being unconnected with inflammation of the lung or of any other organ or tissue, must be referred to some specific influence affecting the general system. What this influence may be is as unknown as the cause of typhoid fever. For convenience it may be called a miasm, meaning thereby a something which affects the system in this particular manner. The biologists urge the acceptance of FRIEDLÄNDER's micrococcus; but it does not appear that this is other than an accidental presence, which, by its association with the pneumonic miasm, or, as in the case of the similarly accidental micrococcus of diphtheria, by the assumption of pathogenic qualities either by itself or the products of its growth, may become of importance as facilitating the spread of the disease in such instances as at Benton Barracks, Mo.,† where an infectious character was recorded.

Clinically, pneumonia was intimately associated with typhoid fever: and it appears to have been produced as a secondary result of the typhoid poison. The depraved condition of the blood in typhoid fever seemed capable of inducing changes in the lungs of a nature

* See *Medical Times and Gazette*, Vol. 11, 1884, p. 844. † *Supra*, page 758.

similar to those produced by the pneumonic miasm. But the uncomplicated cases of pneumonia may not be referred for causation to the influence of the typhoid poison. This proposition is sustained by the want of correspondence observed in the periods of prevalence of the two diseases. Comparing the line of prevalence of pneumonia—diagram facing page 722—with the irregular line of typhoid—diagram facing page 199—among our white troops, there is no evidence of similarity,—this is due to the exhaustion of the susceptibility of our soldiers to the typhoid miasm;—but when the line of pneumonia is compared with that of typhoid in civil communities, where the accumulation of material susceptible to the typhoid influence is a regular and readily calculated quantity, both are found to present a seasonal wave.* There is, however, no correspondence between the waves. The period of pneumonic prevalence embraces the winter and spring months, that of typhoid prevalence the late autumnal and early winter months. In August, September and October, when the typhoid wave is sweeping over the United States, pneumonia is at its minimum. Moreover, were the two diseases due to the same cause, typhoid fever should have supervened on pneumonia in the individual case at certain periods as frequently as pneumonia at other periods on typhoid fever. But this was not the fact:—*Typhoid symptoms* were common in pneumonia, but not a true typhoid fever; and these typhoid symptoms have been satisfactorily referred to other conditions than the mere presence of the typhoid miasm in the system.†

The occurrence of pneumonia in other febrile diseases, as in malarial cases, typhus and the eruptive fevers, indicates its dependence on the depravation of the blood produced by specific febrile miasms rather than on the presence of one particular miasm, as that of typhoid fever. But these secondary cases do not explain the occurrence of the primary and uncomplicated cases of pneumonia in which there is no lesion save that of the lung. For these there must be assumed a miasm which operates like other miasms in deteriorating the blood without producing, as they do, specific lesions in other parts of the system—in fact, a pneumonic miasm.

The attendance of cerebro-spinal meningitis on pneumonia, as on other specific febrile diseases,‡ sustains the claim of the latter affection to an individuality as evident and positive as that of typhoid fever, small-pox or any of the others, although the condition of system produced by these febrile miasms often induces congestions and transudations in the lungs similar to those which are the proper results of a pneumonic fever.

The frequency of defined pericarditis in acute lobar cases, as compared with its infrequency in catarrhal or secondary pneumonias, cannot be ascribed to a participation in the inflammatory processes of contiguous tissues, since pleuritic inflammation was nearly as often associated with the one series of cases as with the other. But pericarditis, like cerebro-spinal meningitis, may be referred to the influence of a pneumonic among other febrile miasms.

Treatment.—Pneumonia was regarded during the war as an inflammation of the lungs with a symptomatic fever; but our medical officers were unsuccessful in their efforts to quiet the inflammatory action or allay the febrile disturbance until a period of apparently natural defervescence had arrived. This, together with the injurious results of all attempts at suppressing the disease by active antiphlogistic measures, and the great tendency of the patient to fall into an asthenic state, reduced the attending physicians in many instances to the necessity of adopting a method of treatment similar to that advocated at a later day by Juergensen§ as based on the doctrine of a specific and self-limited disease.

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* See diagram in note, page 200, *supra*. † See *supra*, page 475. ‡ See *supra*, page 608. § See *supra*, page 802.

An analysis of the history of two hundred and fifty pneumonic patients, including acute lobar and catarrhal cases, treated in thirty hospitals, shows that the practice consisted of an effort to allay the febrile excitement by means which would not at the same time dangerously lower the vital powers, after which measures were taken to facilitate the absorption and extrusion of morbid products while support and stimulants were administered with a liberal hand. It is manifest from the records that our army medical officers did not differ in their views as to the indications to be fulfilled during the continuance of the fever in acute lobar cases or in the active stage of lobular or secondary pneumonia:—To prevent the extension of the inflammation, to restrain exudation in the parts already affected, and to palliate suffering, if the measures adopted to arrest or moderate the disease failed to relieve the distressing symptoms. But there was much uncertainty with regard to the best means of fulfilling these indications.

In some cases at the West End hospital, Cincinnati, Ohio, a purely expectant treatment was adopted: Dry cups and hot fomentations were used, and the patient protected from injurious influences until the pulse and febrile heat became reduced. In the Satterlee hospital of Philadelphia a method of treatment, which was in its essence expectant, consisted of the administration of one-sixth of a grain of sulphate of morphia in half a fluidounce of Mindererus spirit every three hours. A method occasionally adopted at Hospital No. 8, Nashville, Tenn., consisted of a teaspoonful of paregoric every three hours, with a drink of acetate and bitartrate of potash and poultices to the affected side of the chest. Dover's powder, at intervals and especially at night, usually formed part of the expectant as well as of more active systems of treatment, and is frequently reported as having allayed restlessness, promoted sleep and exercised a favorable influence on the progress of the disease; sometimes it formed the main portion of the treatment during the febrile continuance. At Rock Island hospital, Ill., it was frequently given in conjunction with camphor and quinine on account of the prevalence of the malarial cachexia among the prisoners. Surgeon E. McDonnell, 2d N. Y. Art'y, in a report dated April 7, 1862, commends the use of opium:

I have had some bad cases of typhoid fever complicated with pneumonia and some cases of pleuro-pneumonia, which, though obstinate at first, eventually yielded to treatment, and, under the continued use of nutriment and stimulants, did well. My experience in the use of opium in the treatment of pneumonia in civil practice has been favorable, and it has been equally gratifying in my military practice. I must here remark that I think less injury results from the too early administration of stimulants than from their use too late in the disease.

Treatment was sometimes begun by the administration of a cathartic, usually Epsom salt, compound cathartic pill, or blue-pill; but generally the bowels had, on admission, already been acted on. The purgative was followed in some cases by acetate of ammonia and sweet spirit of nitre, as in case 4 of the submitted records. In the hospitals of Alexandria, Va., treatment in some instances was begun by the exhibition of two grains of tartar emetic and twenty grains of ipecacuanha. This was followed at intervals during the pyrexia by two drachms each of camphor-water and solution of citrate of potash.

With or without an aperient or purgative the acute cases were frequently treated by neutral saline solutions, as of citrate or nitrate of potash alone or with veratrum viride or sometimes digitalis. The reduction in the pulse-rate under the action of veratrum viride is often noticed, as from 96 on one day to 70 on the next; but, as in all cases in which a favorable influence was apparently exercised the day of the disease is not definitely stated, the question remains unsettled whether the favorable result would not have occurred had no medication been adopted. In case 13, submitted above, its use, continued for five or six

days, was considered to have benefited the patient; but the violence of the attack would probably have terminated in that time in the absence of the remedy. Besides, in several instances, including case 4, it does not appear to have been efficacious. Two or three drops of the tincture were usually given three or four times a day, but occasionally it was combined with other remedies. Sometimes later in the attack, in febrile recurrences or exacerbations, the American hellebore was a component of the expectorant mixture exhibited.

Digitalis was seldom given except in conjunction with other remedies, usually tartar emetic. Here, also, a favorable change following the administration of the medicines can be but doubtfully attributed to their influence. In one instance, at the Satterlee hospital, in which the pulse fell from 108 on the second day of the disease to 88 on the third, it rose to 104 on the following day notwithstanding the use of the mixture, and continued at that rate until recovery by crisis took place on the seventh day.

Aconite appears to have been seldom employed; it was used in one of the two hundred and fifty cases, but the condition of the patient is stated neither before nor after its exhibition.

But tartar emetic formed the chief reliance during the early period of the attack. It was given in small doses, generally from one-sixteenth to one-fourth of a grain, every two or three hours. The large doses recommended by RASORI, LAENNEC and STOKES were in no instance employed.* It was prescribed with sweet spirit of nitre and morphia, with Epsom salt, acetate of ammonia, citrate of potash or ipecacuanha.

The tartar emetic treatment was usually continued for several days, when, if the disease did not yield, it was replaced by some of the remedies already mentioned or by mercurials, provided no typhoid symptoms were manifested in the meantime. The object of the mercurial treatment was evidently to allay fever, subdue inflammatory action and promote absorption in the probably now consolidated lung. Small doses of blue-pill and opium, calomel and opium, or calomel and Dover's powder, with or without nitre and ipecacuanha, were administered; rarely the iodide was employed. But the remedy was seldom carried to the extent of producing distinct constitutional manifestations.

As mercurials were generally exhibited later in the progress of the disease and correspondingly nearer to the natural termination of the acute attack, we are prepared to find that a strict adherence to the letter of the records indicates this plan of treatment as of greater value than any other in relieving symptoms and removing the disease. Case 1, submitted above,† may be taken as an illustration. Here the antimonial produced no satisfac-

* RASORI of Geneva, in 1808, established the modern system of subduing inflammatory action by tartar emetic. In pneumonia large doses were given with or without previous depletion. From twelve to twenty-four grains were administered in twelve hours, and the doses were increased until several drachms were taken daily. Very satisfactory results are said to have followed this practice; but LAENNEC claimed a lessened mortality when the remedy was given in smaller doses. After general depletion, which he regarded as allaying for a time the violence of the inflammatory action and giving opportunity for the tartar emetic to act, he administered one grain every hour for twelve hours; then the patient was permitted to remain quiet for seven or eight hours; but if the case was severe the medication was continued without intermission until an amendment was perceptible as well by the physical signs as by the general symptoms. See his *Treatise on the Diseases of the Chest*, Forbes's translation, New York, 1838, p. 260. STOKES, at the Meath hospital, generally began with four or six grains on the first day. This was increased by one or two grains daily until ten, twelve or fifteen grains were given in the twenty-four hours. For the reduction of the ordinary inflammations of the lung it was seldom necessary to give more than twenty-five or thirty grains in this manner. See his *Treatise on the Diseases of the Chest*, Phila., 1844, p. 308. It does not appear that this mode of treatment found favor in the United States. EBERLE, Phila., 1831, Vol. I, p. 292, affirms *nauseating* doses of tartar emetic to be generally highly useful in diminishing the action of the heart and arteries and in promoting expectoration. He refers to the treatment by large doses, but seems to have had no personal experience of its use. WOOD, Phila., 1847, Vol. II, p. 47, taught that tartar emetic in small doses was a safe and useful adjuvant to the lancet when not contraindicated by the existence of nausea or vomiting; he discountenanced the use of the Rasorian method as being attended with many dangers. DICKSON, Phila., 1855, p. 610, also objected to the heroic method, and sought to procure its advantages with less risk by the administration of one-fourth or one-half of a grain every two or three hours. He preferred, however, to substitute for the antimonial other sedative relaxant and diaphoretic medicines of a safer and less irritant character. Surgeon CHARLES TRIPLER, U. S. A., at a meeting of the New York Academy of Medicine, Nov. 15, 1865,—*Bulletin of the Academy*, Vol. II, 1862–66, p. 526,—stated that many years ago, while stationed at a recruiting depot in Kentucky, pneumonia prevailed among the men. Seventeen cases, all terminating favorably, were treated during one winter. During the formative stage he gave tartar emetic, beginning with quarter-grain doses, which were frequently repeated and increased until the point of tolerance was reached. Dry cupping in mild cases, wet cupping in severe cases, with hot fomentations over the whole chest were employed. He had given veratrum viride in some of the cases, but was cautious in its administration, having seen dangerous prostration from even small doses. In the stage of resolution calomel and opium were resorted to in conjunction with blisters. Dr. TRIPLER said that this plan of treatment was subsequently adhered to by him.

† Page 752.

tory results, even when on the fourth day its dose was doubled, for on the next day its use was abandoned with the fever still high. Calomel was given, and on the following day a favorable change was manifested. But when the calomel treatment was adopted from the onset its seeming beneficial influence was not so manifest.

On account of the inefficacy of medication during the continuance of the febrile condition many of the cases, especially those of some duration, show by the changes in the treatment from day to day the uncertainty of the physician and his desire to benefit the patient without exposing him to any risk of harm from the means employed. Thus, small doses of antimonials gave place to mercurials or *vice versa*, or the change was made from one to a combination of both, or to an abandonment of both in favor of neutral mixtures with veratrum viride or ipecacuanha and morphia.

On one point, however, there was great unanimity,—general depletion was rarely employed as an antagonist to the febrile state. Medical officers recognized the adynamic influences that affected the troops and declined, in a disease which was so frequently fatal by asthenia, to purchase temporary relief at the expense of an impoverishment of an already deteriorated blood. Death from apnœa was rare, occurring seldom except in those congestive cases in which a rapid progress to insensibility and a fatal result was attributed rather to the influence of a specific poison, generally the malarial, than to the causes of ordinary pneumonia. In but one of the two hundred and fifty cases was general bleeding considered advisable for the safety of the patient during the continuance of the active symptoms. This case, No. 2 of those submitted above, appears to have been a typical instance of lobar pneumonia. In case 15 venesection was employed, but not to subdue fever; it was tried as a last resource for the relief of urgent dyspnœa in the progress of secondary pneumonia. Temporary benefit followed the operation, but the fatal result was not averted. Among the occasional notes made by medical officers on their monthly or quarterly reports, the following contain the only recommendation of general bleeding that has been discovered:

Surgeon M. R. GAGE, *25th Wis., Dec.* 31, 1862.— * * * * Since that period [early in December, 1862] cases of congestion of the lungs have been quite numerous, but under the following plan of treatment have been mostly brought to a successful issue. First, the administration of tartar emetic *ad nauseam*, giving the remedy every one, two or three hours, according to the urgency of the symptoms, and making thorough counter-irritation to the thoracic region. Free catharsis is induced by podophyllin and calomel in those cases in which the tartar emetic does not itself sufficiently act upon the bowels for depletory and revulsive purposes. One case of congestion of the lungs proved fatal while on the march across the bleak prairies from Mankati to Maiona in severely cold weather. I did not see the case; but am informed that the patient was almost at once overwhelmed, the attack proving fatal in a few hours. Doubtless venesection might have been in this instance very properly practiced, but whether or not successfully of course cannot be said. * * * Veratrum viride is sometimes made use of, but I think does not act with that promptness and efficiency which long experience has shown to result from the administration of tartar emetic

Surgeon M. R. GAGE, *25th Wis., March* 31, 1863.—In most cases this disease is ushered in by slight or severe chills, soon followed by increased heat of surface and severe febrile symptoms. There will also be found often pain in the loins and a stitch in one or both sides of the chest, accompanied with cough, and in many cases dyspnœa and great pectoral oppression. In the beginning the cough will be dry and harsh, but there soon appears a frothy mucous expectoration, which becomes in a short time the rust-colored sputa so characteristic of this complaint. A full and bounding pulse shows the excited state of the circulation. If the case be ushered in with symptoms of great severity venesection is promptly resorted to and is, we believe, the only reliable means of arresting or controlling the disease. The bleeding should not be stinted but liberal; a large opening should be made in the vein and a full, free stream allowed to flow until syncope is established. This course, it must be understood, is applicable only to those who are healthy and plethoric, and when the onset of the affection threatens imminent peril to the integrity of the organs attacked. In the case of a feeble constitution, or when the pulmonary organs are already affected by tuberculosis, there would be doubt as to the propriety of bloodletting, or, if decided upon, a manifest impropriety in carrying it to the extent just indicated. After the bleeding tartar emetic is administered *ad nauseam;* cathartics may also be brought into requisition, and are invaluable adjuncts in pursuing the treatment already shadowed forth: Dover's powder, ipecacuanha and calomel, in alterative doses, are of the first importance in assisting the efforts of nature to clear the affected lung from the inflammatory products deposited in the air-cells. Cupping over the pectoral region may be

employed in the early stages to good advantage; benefit may also be derived from the application of sinapisms and at a later period from blisters. The patient toward the end of the attack may require a supporting course, such as beef-tea, wine, quinine, etc. [During the quarter ending March 31, 1863, Surgeon GAGE treated in his regimental hospital eighty-eight cases of pneumonia, six of which terminated fatally.]

But even in the congestive cases recourse was more frequently had to quinine, blisters and stimulants than to general depletion, as is illustrated by the following extract from a report of Surgeon J. E. SANBORN, 27th Iowa, dated at Jackson, Tenn., April 30, 1863:

Our most alarming case has been that of Lieut. B——, of Co. K, a man of most excellent habits. A violent chill was followed by fever of extraordinary severity and duration. This was soon broken up by the use of quinine. Within forty-eight hours was developed severe pneumonia (congestion?) of the right lung, which, for a few hours, threatened to be speedily fatal; but he was rescued from this imminent danger by the prompt use of blisters, with stimulants of brandy, carbonate of ammonia and quinine. He is now convalescent.

Generally the severity of the chest symptoms in the acute stage of pneumonia was sought to be relieved by hot fomentations, poultices, dry cups, and sometimes by the local abstraction of blood.* In other cases, where the risks attending the exposure incident to fomentation were conceived to outweigh the benefits to be derived from it, the patient was encased in a padded oiled-silk jacket. But the details of treatment are so meagre that it is impossible to say, from the records, not only that any of these measures had a favorable influence on the progress of the disease, but even that they effected the primary intent of alleviating the distress of the patient.

Although the treatment during fever was timorous, vacillating and tending to expectancy, the occurrence of a sudden or general depression, or the onset of ataxic symptoms, removed all uncertainty as to the line of action.

On the subsidence of the arterial excitement the removal of the pneumonic products had to be effected. Generally this process in primary or lobar pneumonia was regarded as one of absorption which would take place with a rapidity and efficiency proportioned to the strength and vitality of the system. The patient was therefore supported with the best nourishment which the hospital afforded and with mild stimulants and tonic remedies, while care was exercised to avoid the slight exposures that were so prone to cause relapses or induce secondary catarrhal affections in the air-cells. Hence, we find beef-essence, chicken-broth, raw eggs, wine-whey, sherry, catawba, whiskey-toddies, milk-punch, eggnog, brandy, beer, porter, quinine, compound tincture of cinchona, citrate of iron and quinine, tincture of iron, etc., appearing generally on the records at this stage of the disease; generally, also, blisters were applied to promote absorption.

But when there remained a cough with expectoration, leading to the supposition that the material exuded in the air-cells or the disintegrated pulmonary tissue was thus in part to be removed, small doses of expectorant medicines were embraced in the treatment. Syrup of ipecacuanha and squill, compound syrup of squill, compound liquorice mixture and syrup of tolu, with or without paregoric, were the remedies commonly prescribed.

In many cases the continuance of cough, expectoration and more or less pain, with intercurrent febrile attacks, indicated the existence of secondary inflammation. During the usually prolonged duration of these cases good nourishment, expectorants and counter-irritants were employed, with an incidental return to tartar emetic or mercury and hot fomentations or cups in the event of a febrile accession. Senega and wild cherry were largely used. Chloride of ammonium was also employed in many of these cases alone or in conjunction with mercury

*The removal of two to four ounces of blood by the application of wet cups to the side was said to have promptly and permanently relieved the pain in pneumonic attacks among the prisoners at Camp Douglas, Ill.—See J. H. HOLLISTER in *Chicago Medical Examiner*, Vol. III, 1862, p. 381.

or expectorants. Donovan's solution was recommended by one medical officer.* Sinapisms, turpentine stupes, pitch, warming and belladonna plasters, croton-oil and cantharides were used as local applications in accordance with the apparent requirements of the individual case. Hectic fever appears always to have suggested the use of aromatic sulphuric acid.

When typhoid symptoms were manifested in the progress of an acute pneumonia turpentine was administered, with support and active stimulation. The turpentine was given in doses of fifteen drops, frequently repeated, as in typhoid fever. Sometimes it was combined with other remedies, as the chlorate of potash. Tincture of cantharides with whiskey was used at Rock Island hospital, with what effect the records do not demonstrate.

Carbonate of ammonia appears to have been held in great esteem when ataxic symptoms were developed in the course of secondary or catarrhal inflammations.† The cases are exceptional in which it was not employed. It was generally administered with some expectorant or with the extract of wild cherry. The records do not afford the materials for determining its value.

At the Rock Island hospital relief to the oppressed breathing was sought to be obtained by inhalations of iodine, turpentine, ether, alcohol and chloroform; and in some cases in which the patient was threatened with suffocation from inability to clear the air-passages, recourse was had cautiously to the use of the fumes of burning cayenne pepper, from which, it is said, much relief was experienced.

X.—PLEURISY.

The clinical records of pleurisy consist merely of names, dates of attack and return to duty, and occasional notes of treatment. *Post-mortem* observations have been preserved in forty-five cases, six of which were connected with measles; but as the rate of fatality of pleurisy was only 1.8 per cent. these histories give no idea of the character of the 31,852 cases that were reported among the white troops during the war, although they may be accepted as fairly illustrating the nature of the 590 fatal cases. At the same time the want of records of the milder cases may be construed as evidence of their freedom from notable peculiarities. Of the thirty-nine fatal cases on record, both sides of the chest were affected in twelve; the right side chiefly in fifteen; the left side in twelve. The pericardium was frequently involved in the inflammatory action, especially where both pleural membranes were affected. Pericarditis was probably present in seven of the twelve cases of double pleurisy; in two of the fifteen in which the right side was the site of the disease, and in two of the twelve in which the left side was attacked.

Double Pleurisies.—Case 1 is a rapid case in which death occurred within nineteen hours after the termination of the initiatory chill; in 2 the thorax contained 240 ounces of sanguinolent serum; in 3 pus was present in both cavities; in 4 the right pleural cavity contained eleven pints of purulent liquid, the left three pints of flocculent serum; in 5 the

*J. H. Hollister, in the article cited in last note, says:—"My attention was early called by Dr. Winer to the use of Donovan's solution in the treatment of pneumonia. I watched its effects in about seventy-five cases; as many as forty I treated with this medicine alone in connection with a nutritious diet, and I must say that in most instances I was charmed by the result. The tonic effect of the arsenious element and its stimulation of the capillary system fulfilled an important indication. The mercurial alterative was here exhibited sufficiently to fully meet the necessity of the case, while the glandular stimulation of the iodine seemed to complete the requirement. It is contraindicated where there is decided irritability of the stomach and bowels, or where, in the advanced stage of the disease, the system is greatly prostrated. The dose is from ten to thirty drops in milk every two hours."

†A. Patton of Vincennes, Ind.,—*American Journal Medical Sciences, N. S.*, LX, 1870, p. 370,—reports favorable results in pneumonia from the carbonate of ammonia given in five to ten-grain doses every two hours continuously from the beginning of the attack. He claims to have treated 96 cases in this way with only two deaths, and cites the experience of neighboring physicians as, with his own, aggregating 309 cases thus treated, of which only 8 were fatal.

characteristics of the attack were not recorded: in 6 and 7 both sides of the chest contained effused serum, and there was a large effusion in the pericardium, amounting to one pint in the former and to one quart in the latter instance; in 8 similar effusions were associated with thickening of the pericardium, and in 9, 10 and 11 with distinct evidence of pericarditis; in 12 there were deposits of pus in the peritoneum along with the pleuritic adhesions and purulent layers, thickening of the pericardium and turbidity of its contained serum.

CASE 1.—Private Charles Headley, Co. B, 32d N. Y.; age 25; was admitted Nov. 10, 1862, convalescing from a wound of the back. On the night of the 19th the patient slept before an open window, and next morning was seized with a chill which lasted until 4 P. M. and was followed by high fever with a pulse of 120, hot and dry skin, anxious countenance and embarrassed breathing. There was dulness on the left side, especially over the anterior and lower part of the lung, where also the respiratory murmur was feeble; tubular breathing was heard in the upper part of the lung: dulness was marked also on the right side. Quinine and Dover's powder were given and wet cups applied to the chest. The patient grew rapidly worse, his countenance becoming dark, respiration labored, pulse about 140 and almost imperceptible, and the area of dulness on the left side increased. He died at 11 A. M. of the 21st. *Post-mortem* examination: Body well developed. The left pleural cavity was distended with serum and the lung, which was pressed forward, was about three inches thick and covered with a layer of lymph about a quarter of an inch thick: otherwise the lung was healthy. The right side contained effused serum, but the lung was healthy. The other organs were normal.—*Hospital, Frederick, Md.*

CASE 2.—Corp'l William H. Braman, Co. H, 28th Ind.; age 20; admitted Feb. 18, 1865, exhausted: Respiration hurried: cough dry; pulse hard; tongue coated; voice sharp and tremulous; left side comparatively motionless; dulness on percussion; much pain; decubitus dorsal. March 5: Tongue clean; appetite better; more cheerful. Heart appeared to be pressed forward and upward under the sternum; decubitus left dorsal. He became worse, and died on the 12th. *Post-mortem* examination: Left pleura firmly adherent to sternum and ribs; lungs much compressed; heart pressed over to right side, adherent in places; bronchial tubes of right side inflamed; two hundred and forty ounces of bloody serum in the thorax.—*Third Division Hospital, Alexandria, Va.*

CASE 3.—Hezekiah Hulsey, a citizen of Jackson County, Alabama; admitted Jan. 6, 1864. Died February 5. *Post-mortem* examination: Extensive pleuritic adhesions on both sides; right pleural cavity contained four pints of pus, left three pints; lungs collapsed; heart healthy.—*Hospital No. 1, Nashville, Tenn.*

CASE 4.—Private Erastus W. Bailey, Co. F, 12th Ohio Cav., was received Sept. 16, 1864, from hospital at Lexington, Ky., where he had been under treatment four months for pleurisy. He was so feeble as to be entirely helpless. His body and upper extremities were exceedingly emaciated and his feet and legs swollen to their utmost extent. He could rest only by supporting his head upon something placed before him while sitting in his chair: he had some cough and expectorated small quantities of highly offensive sanguineous, purulent mucus, which formed sordes on the teeth and lips; he had also chronic diarrhœa, with hemorrhage from the bowels and occasional hæmoptysis and epistaxis. He was unable to take either stimulants or nourishment, and the entire body gave off an offensive cadaveric odor. He died ninety hours after admission. *Post-mortem* examination discovered eleven pints of fetid, purulent liquid in the right pleural cavity, the serous surface being thickly covered with dirty-looking lymph; the lung was adherent to the mediastinum, compressed to an inch and a half in thickness, carnified and impermeable to air except a small portion of the apex, in which faint crepitus could be detected. The left pleura contained about three pints of serous fluid mixed with flocculi of lymph: the lung was compressed and closely adherent to the posterior and lateral costal pleura by firm adhesions: the lower lobe and part of the upper were quite hepatized, with occasional emphysematous patches resembling blebs or blisters on the surface: the permeable portion contained frothy mucus commingled with purulent fluid similar to that found in the right pleural cavity. Both lungs were infiltrated with tuberculous matter in various stages of softening, but contained no cavities. The pericardial sac was normal. The right side of the heart was enlarged and the vena cavæ and pulmonary artery distended. The portal system was intensely engorged, but presented no evidence of inflammatory action. A preserved portion of the mesentery and ileum presents the appearance of a carefully prepared arterial and venous injection of the parts. The liver was abnormally large and firm, of an olive-green color mottled with brown and highly congested: the gall-bladder was empty: the spleen and pancreas normal. The kidneys were somewhat enlarged and congested: their section presented numerous hemorrhagic spots, and the entire structure contained mineral concretions, some of which were of considerable size: many of the Malpighian bodies were tinged with blood and the tubular cones deeply congested: the ureters and bladder were normal. The alimentary canal presented no evidence of ulceration, but was intensely congested: the mesenteric glands were enlarged and contained tuberculous deposits. It is remarkable that in his diseased condition the poor fellow was able to endure the fatiguing journey from Lexington to this place. For days prior to his death the respiratory function must have been performed by a portion of the lung not exceeding one-eighth of its ordinary bulk. The congestion of the venous and portal system and hypertrophy or distention of the right side of the heart and its appendages were evidently consequent to the obstructed pulmonary circulation, and the anasarcous condition of the extremities a natural sequence of their dependent position in the relaxed and debilitated condition of the physical organism.—*Surgeon Jas. C. Whitehill, U. S. V., Marine Hospital, Cincinnati, Ohio.**

CASE 5.—Serg't B. F. Kirby, Co. C, 61st Va. Cav.: admitted Jan. 4, 1864. Died 12th. *Post-mortem* examination:

* [illegible] by P. C. Pennell, *Cincinnati Lancet and Observer*, Vol. VII, new series, 1864, p. 570.

There was recent pleurisy on both sides, but no pneumonia. The heart was healthy. The peritoneum covering the liver and spleen was coated with fresh flakes of lymph; the liver and kidneys were healthy; the spleen of moderate size and very firm.—*Ass't Surgeon Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 6.—James Demovill, Co. C, 10th Mo. Cav.; age 23; admitted Feb. 22, 1863, having been affected with some asthmatic trouble for three months. Respiration became hurried and labored, and he died on the 26th. *Post-mortem* examination: About two quarts of serum in the pleuræ, a pint in the pericardium; no lymph.—*Lawson Hospital, St. Louis, Mo.*

Case 7.—Private William Dodson, Ferguson's Ark. Regt. Pleurisy and pericarditis. Died Jan. 19, 1865. *Post-mortem* examination: There was pleuritic effusion on both sides, with collapse of both lungs. The pericardium contained a quart of serum.—*Act. Ass't Surgeon H. C. Newkirk, Hospital, Rock Island, Ill.*

Case 8.—Private Thomas Barnett, Co. K, 10th West Va.; age 52; was admitted Oct. 16, 1864, with chronic rheumatism and night blindness. He could walk about; his appetite was good; his wrist-joints were much swollen and painful. He improved until November 12, when he was attacked with diarrhœa and jaundice. As the yellow color was disappearing, on the 25th he was seized with severe pain in the right side and dyspnœa, which became extreme on the 26th, when he died. *Post-mortem* examination: Body much emaciated. Thorax filled with serum, compressing the lungs; right pleura costalis much reddened; pericardium thickened and containing serum. Remaining viscera normal.—*Ass't Surgeon David Shaner, 6th West Va., Cumberland Hospital, Md.*

Case 9.—Corp'l Franklin C. Palfrey, Co. G, 6th U. S. Inf., was admitted Dec. 30, 1862, with scurvy. He died Feb. 19, 1863. *Post-mortem* examination: The right lung was adherent and filled with tubercle; the left lung was also adherent, but the adhesions formed a sac which contained more than two pints of serum. The heart was normal, but the pericardium showed marks of recent inflammation and was full of serum. Altogether there were six pints of liquid in the serous cavities of the thorax. Abdominal viscera normal.—*Harewood Hospital, Washington, D. C.*

Case 10.—Corp'l William Hinton, Co. E, 5th Pa. Reserves; age 35; admitted July 31, 1862, with a gunshot wound of the right arm Died October 4, of pleurisy and pericarditis. *Post-mortem* examination: Body not emaciated; lower extremities œdematous; the right arm had been removed at the shoulder-joint. The right lung was adherent at the upper and back part, but the serous sac in its lower part was covered with a thick pyogenic membrane and contained a quart or more of thick pus which compressed the lung and pushed the heart over nearly to the left of the median line. There were recent pleuritic adhesions on the left side, and the cavity contained over a pint of clear serum, but the lung-substance was unaffected. The pericardium contained about six ounces of liquid and was partially adherent to the surface of the heart, which was exceedingly rough from pseudomembranous vegetations. [See *Specimen* 68, Med. Sec., Army Medical Museum.] The liver was in a state of incipient cirrhosis; its right lobe was flattened above, apparently from the purulent accumulation in the chest. The remaining organs appeared normal. The patient having had symptoms of pyæmia, the left external iliac and femoral veins were examined and found to be distended with a fibrinous clot closely adherent to their walls; in several parts the clot appeared to be undergoing degradation into granular puruloid matter.—*Act. Ass't Surgeon J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 11.—Private Jno. McPlauson, Co. E, 10th Ohio Cav.; age 30; was admitted May 6, 1864, with congestion of the lower lobe of the right lung, upper lobe of the left lung and suspected effusion: High fever, pulse 130, tongue black, pain in breast, dyspnœa and dulness over the whole of the chest. He improved for a few days, but on the 9th pain in the left side became more acute, dyspnœa increased and the pulse quickened. 11th: Sinking fast; extremities cold; pulse very quick; mind rational. 12th: Died. *Post-mortem* examination: Chest abnormally prominent and containing fifty-four ounces of sero-purulent fluid; congestion of lungs and extensive pleuritic adhesions; pericardium showing inflammatory appearances, including six ounces of fluid.—*Hospital, Madison, Ind.*

Case 12.—Private William T. Morrow, Co. F, 48th Tenn. Died Feb. 18, 1865. *Post-mortem* examination: There was inflammation of the pleura on both sides, with slight adhesions and patches of pus at several places; the lower lobe of the left lung was enlarged and slightly inflamed. There was inflammation and thickening of the pericardium, which contained four ounces of turbid serum. Small thrombi were found in the heart. The peritoneum was inflamed and presented occasional deposits of pus.—*Act. Ass't Surgeon J. M. Witherwax, Hospital, Rock Island, Ill.*

The PLEURISIES OF THE RIGHT SIDE may be indexed as follows:—In the seven cases, 13–19, effused serum or adhesion from plastic exudation was mainly confined to the right side; in 20 and 21 the contained fluid was sero-purulent, and in the four cases, 22–25, purulent, its quantity in 24 and 25 being respectively twenty-one and eighteen pints. The pericardium was distended in 26 and distinctly inflamed in 27.

Case 13.—Private John Robinson, Co. G, 112th Pa., was admitted Feb. 24, 1864, having been sick for four days with pain in the side, cough and shortness of breath. The right side was dull as high as the fourth rib, above which large mucous râles were heard; the cough was frequent and the expectoration a thick mucus. On March 4 the pain in the right side became aggravated and the dulness extended higher up. A blister was applied, and quinine and beef-tea prescribed. On the 12th dulness was complete on the right side, which was immobile during respiration; the superficial veins were distended and there was considerable dyspnœa, the face being purplish, the pulse 120 and the respiration 40. At 9 P. M. the symptoms appeared so urgent, the pulse having risen to 132 and the respiration to 60, that a valvular opening was made in the integument covering the sixth intercostal space near the angles of the ribs and a trocar was introduced. There was at first some obstruction to the flow, but by passing a probe into the

canula straw-colored serum to the amount of twenty-four ounces was withdrawn, the chest became clear anteriorly and the dyspnœa diminished; but the patient being much prostrated, it was thought best to close the wound by adhesive strips and a compress without removing the whole of the fluid. He died on the 13th. *Post-mortem* examination: The right pleural sac contained twenty-four ounces of bloody serum; the lung was compressed against the spine and the upper lobe consolidated; thick false membranes covered the pleura and soft bridles of exuded material traversed the cavity in every direction. The left lung was congested by hypostasis. The heart was healthy. The other organs were not examined.—*Act. Ass't Surgeon A. D. Hall, Filbert street Hospital, Philadelphia, Pa.*

Case 14.—Private Richard Williams, Co. G, 9th Mich. Cav., a paroled prisoner from Richmond, Va.; age 22; was admitted April 18, 1864, with chronic diarrhœa. He died on the 25th. *Post-mortem* examination: The right lung was collapsed and covered by a thin layer of pasty lymph [*Specimen* 340, Med. Sec., Army Medical Museum], the pleural cavity being filled with serum. The left lung was hepatized in its lower lobe and had miliary tubercle in its upper lobe. The heart was flabby and contained large clots; there was effusion in the pericardium. The liver was normal; the gall-bladder empty; the intestines inflamed; the kidneys hypertrophied.—*Jarvis Hospital, Baltimore, Md.*

Case 15.—Private Isaac Davis, Co. I, 9th V. R. Corps, was admitted Feb. 23, 1864, and died March 31. *Post-mortem* examination: Body not much emaciated. The right pleural sac contained six pints of serum; the lung was collapsed and had old adhesions on its inner, upper and posterior surfaces and recent adhesions on its outer surface. The left lung was everywhere adherent, some of the adhesions appearing to be recent, and its lower lobe was hepatized.—*Act. Ass't Surgeon N. T. Martin, Harewood Hospital, Washington, D. C.*

Case 16.—Private Joseph Hurlburt, Co. F, 9th East Tenn. Cav.; admitted Jan. 30, 1864. Died February 27. *Post-mortem* examination: The brain was healthy. The right lung was collapsed by the pressure of eighty ounces of effused serum in the pleural cavity. The heart was hypertrophied, its endocardium inflamed and its valves thickened. The spleen weighed twelve and a half ounces. The other abdominal viscera were normal.—*Hospital No.* 19, *Nashville, Tenn.*

Case 17.—Private Jacob Gray, Co. G, 1st Ga.; age 50; admitted Jan. 27, 1864. Died February 14. *Post-mortem* examination: Sixty-six ounces of serum in the right pleural cavity; eleven ounces in the left, with soft lymph coating the serous surfaces; the right lung tubercular and inflamed around the deposits, a large vomica in its apex; a few dormant tubercles in the left lung. Four ounces of serum in the pericardium; nine ounces in the peritoneum; liver, kidneys and intestines healthy; spleen softened.—*Hospital No.* 1, *Nashville, Tenn.*

Case 18.—Private Herman Raatz, Co. F, 26th Wis.; admitted Jan. 22, 1863, with remittent fever. Died February 1. *Post-mortem* examination: Body greatly emaciated; excoriations on the back over the bony prominences. There was a copious sero-purulent collection in the right pleural cavity; the lung adhered at its lower and anterior parts to the parietal pleura: tubercles were scattered through its substance, but were most numerous in the upper lobe, where, also, were found some small and one or two large cavities. The upper lobe of the left lung contained a few small tubercles; the rest of the lung was healthy. The only abnormities observed in the abdominal cavity were slight engorgement of some of the mesenteric glands and a rather unusual injection of the omentum and mesentery.—*Third Division Hospital, Alexandria, Va.*

Case 19.—Private Luman A. Johnson, Co. H, 4th N. Y. Heavy Art'y; age 22; was admitted from the Army of the Potomac Nov. 7, 1864, with typhoid pneumonia, and died December 8. *Post-mortem* examination: Body much emaciated. The left pleural sac contained a few ounces of bloody serum, the membrane being firm, opaque and thickened by deposits of lymph; the right cavity was obliterated by firm fibrinous adhesions; both lungs were studded with tubercles. The opposed surfaces of the pericardium were so firmly adherent that it was almost impossible to separate them; the external surface of the heart was studded with minute granulations resembling tubercle, which did not penetrate the cardiac substance, but appeared to be in or immediately beneath the pericardium. The spleen, ten ounces, contained minute yellowish-white tubercle-like bodies. The liver, forty-eight ounces, was very light in color; the kidneys appeared to be normal. The mucous membrane of the intestines was much congested.—*Act. Ass't Surgeon H. M. Dean, Lincoln Hospital, Washington, D. C.*

Case 20.—Private Alexander H. Day, Co. C, 1st Me. Cav.; age 57; admitted Jan. 12, 1864. Diagnosis: Pneumonia. Died 30th. *Post-mortem* examination: Right lung compressed, solid, lower part congested; right pleura much thickened, a strong fibroid adhesion, apparently of long standing, separating it into two cavities containing twenty-four ounces of serum, lymph and pus.—*Third Division Hospital, Alexandria, Va.*

Case 21.—Private Michael Ford, 57th N. Y.; age 21; was admitted Feb. 17, 1864: Much prostrated; cheeks dusky; lips livid; tongue coated darkly; sordes on teeth; pulse frequent and quick; respiration abdominal and frequent; could speak only by inspiring at every few words; sharp pain in lower part of right chest; mucous râles generally diffused. He died on the 20th. *Post-mortem* examination: Left lung healthy; right pleura containing four pints of serum, pus and lymph; right upper lobe compressed; middle lobe compressed and adherent by fibrinous bands; lower lobe closely adherent; lung-substance soft and friable; pleurisy more severe in diaphragmatic portion. Heart healthy; three to four ounces of serum in pericardium.—*Third Division Hospital, Alexandria, Va.*

Case 22.—Private Bennett Bunton, Co. E, 5th Tenn.; age 34; admitted May 22, 1864: Emaciated; typhoid delirium; pulse small, quick and wiry; dulness over right side; absence of respiratory and vocal sounds; enlargement of liver. Died on day of admission. *Post-mortem* examination: Purulent collection in right pleural cavity; right lung compressed; liver hypertrophied.—*Act. Ass't Surgeon M. K. Gleason, Hospital, Rock Island, Ill.*

Case 23.—Private John Kenyon, Co. B, 19th N. Y.; age 19; was admitted Sept. 3, 1862. In a few days he was seized with chills followed by high fever, which abated at the same hour daily but was never entirely absent. Some days later he complained of pain in the right side and of difficulty in breathing. He was treated with opium, quinine

and diaphoretics. On November 22 his pulse was feeble, 120, skin cold, respiration 48 and face highly flushed; he was delirious at night; pain in the right side was increased on breathing and there was dulness anteriorly and posteriorly. A mush poultice was applied and brandy and beef-essence prescribed. The expectoration became tenacious and somewhat rusty on the 24th and respiration increased to 54, but the nocturnal delirium ceased. The bowels at this time became relaxed. Carbonate of ammonia, wild cherry and morphia were prescribed. His condition was but little changed during the next ten days; cough was very troublesome, but the expectoration became more copious, somewhat less tenacious and less rusty in color; emaciation was noticeable and the case began to resemble one of tuberculosis. On December 8 profuse perspiration occurred. On the 13th the expectoration became greenish and diarrhœa set in. On the 16th the patient slept a good deal and was much oppressed, the perspiration continuing. He died on the 17th. *Post-mortem* examination: The brain was healthy. The right lung was collapsed to about the size of the fist, the pleura everywhere forming a roughened pyogenic membrane [*Specimen* 334, Med. Sec., Army Medical Museum] and its cavity containing about one and a half gallons of pus. The left side was free from pleurisy; the lung was somewhat inflamed, especially along the anterior border; its bronchial mucous membrane was inflamed and the bronchioles filled with muco-pus. The heart and pericardium were normal. The liver was impressed by the purulent accumulation in the right pleura and the interlobular vessels were so much congested as to give the organ a strongly mottled appearance. The stomach, spleen, pancreas, kidneys and suprarenal bodies were healthy. The small intestine was of a rather brighter pink than natural and presented several patches of moderate inflammation with ecchymoses. The cæcum was inflamed, rose-red, and showed a multitude of scattered ecchymoses about the size of pin-heads; the remainder of the large intestine had several irregular small patches of moderate inflammation accompanied by ecchymoses.—*Act. Ass't Surgeon J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

CASE 24.—Private David Hassack, Co. A, 139th Pa.; age 19; was on light duty after recovery from a flesh wound of the arm when, on Jan. 7, 1865, he had a severe attack of pleurisy. Ten wet cups were applied to the right side of the chest and about sixteen ounces of blood withdrawn, after which a cathartic was given, followed by repeated doses of tartar emetic. The bowels were moved freely and next day the patient breathed with less difficulty. On the 9th there was a recurrence of severe pain under the right nipple and great dyspnœa. Turpentine was applied to the chest. Calomel was substituted for the antimony on the 15th, as the latter was producing excessive nausea. Salivation was manifested on the 21st and the mercurial was discontinued. Milk-punch and beef-tea were prescribed and a blister applied; but the dyspnœa gradually became aggravated, and death took place February 15. *Post-mortem* examination: The right lung was collapsed—about the size of the fist—and solidified; the right pleural cavity contained twenty-one pints of pus.—*Act. Ass't Surgeon R. H. Longwill, Mower Hospital, Philadelphia, Pa.*

CASE 25.—Private Clark Martin, Co. B, 6th Ala. Cav.; admitted Nov. 3, 1864. Died December 14. *Post-mortem* examination: Body not much emaciated. There was great enlargement on the right side of the chest, which contained over nine quarts of green pus; the lung was compressed to about three-quarters of an inch in thickness and presented a brown, leathery appearance.—*Act. Ass't Surgeon W. Matthews, Hospital, Rock Island, Ill.*

CASE 26.—Private Andrew J. Orr, Co. E, 25th Tex. Cav.; was admitted Jan. 24, 1863, with chronic diarrhœa and erysipelas. He died March 30. *Post-mortem* examination: The right pleural cavity was filled with lymph, serum and pus. The pericardium was distended with serum; the heart was large, weighing thirteen ounces, its right ventricle dilated, its walls thinned and the mitral and tricuspid valves insufficient. The liver was enlarged to double its usual size.—*City Hospital, St. Louis, Mo.*

CASE 27.—Private James N. Parsons, Co. E, 124th N. Y.; age 27; was admitted June 18, 1863, complaining of rheumatic pains from which he said he had suffered since December, 1862. He was in good flesh and had an excellent appetite. On June 22 he was attacked with pleurisy of the right side, for which a blister and active cathartic were prescribed, followed by doses night and morning of calomel, hyoscyamus and ipecacuanha and a mixture containing veratrum viride. The pain and cough became much lessened and the patient decidedly improved, whereupon, on the 27th, quinia in tonic doses was substituted for the other medicines. Next day he was racked with an almost incessant and painful cough and was obliged to maintain a sitting posture; his pulse was 120 and feeble; skin cool, moist, almost clammy and tongue coated. Percussion yielded a dull sound over the whole of the right lung, more marked over its lower portion. A cough mixture, milk-punch and beef-tea were prescribed, with poultices to the chest. On the 29th the sputa became rust-colored and a slight diarrhœal attack was noted, which continued during the 30th. Astringents and one ounce of whiskey every hour were prescribed; but the patient failed rapidly, and died July 1. *Post-mortem* examination: The right pleural sac was lined with a pseudomembranous deposit from three to four lines in thickness and contained a large quantity of serum; the lung was condensed and adherent in many places. The base of the left lung was hepatized. The pericardium was lined with a pseudomembrane similar to that found on the right pleura.—*Act. Ass't Surgeon Geo. B. Boyd, Mower Hospital, Philadelphia, Pa.*

PLEURISY OF THE LEFT SIDE.—Of the cases in which the left side was chiefly affected the membranes were closely adherent in 28; serum distended the cavity and compressed the lung in the four cases, 29–32, displacing the heart in the first mentioned case; lymph and pus were present in 33 and pus in 34–36, the quantity in the last having amounted to eighty-eight ounces; in 37 and 38, with lymph, pus or serum in the pleural cavity, the pericardium was said to be inflamed in one case and filled with serum in the other, while in 39, in which the pus contained in the pleura had an exit through an opening in the sixth

intercostal space, there was purulent matter in the pericardial sac, which was roughened on its serous surface.

CASE 28.—Private Merritt C. Frost, Co. G, 89th N. Y.; age 19; was admitted Dec. 13, 1862, with symptoms of typhoid fever: Nervous disturbance with an irritable pulse of over 100, dyspnœa, cough with a copious yellowish-white, tenacious expectoration, dulness with moist râles over the left side of the chest and a diarrhœa of three to five stools daily. Stimulants, expectorants, astringents and nourishment were prescribed. For a short time toward the end of December the patient appeared to be improving; but the diarrhœa returned on several occasions after being temporarily checked, and the prostration increased. About January 14 the cough became dry. He died on the 30th. *Post-mortem* examination: Body extremely emaciated. There were some slight recent adhesions at the lower and fore part of the right lung, which was otherwise healthy. The pleura of the left lung was in a state of tubercular degeneration; the deposit, averaging one-eighth of an inch in thickness, was especially dense at the apex of the lung, whitish-yellow in color and firmly adherent to the surface of the lung and walls of the thorax; the substance of the lung was congested but contained no tubercles. The bronchial glands were tubercular and very much enlarged. The heart was flabby. The lower third of the ileum was intensely congested in patches and its mucous membrane softened, but Peyer's glands were not enlarged; the mesenteric glands were enlarged and dark-purple. The other abdominal viscera were apparently healthy.—*Act. Ass't Surgeon Francis M. Lewis, Satterlee Hospital, Philadelphia, Pa.*

CASE 29.—Private Samuel Lyle, Co. D, 118th Colored Troops, was admitted July 14, 1865. The patient was weak and anæmic; had a slight cough and expectorated glairy mucus. He had marked dyspnœa, which was greatly increased on attempting to lie on the right side; he also had a tendency to syncope when in the erect position. The left side of the chest was fuller than the other,—it did not expand on inspiration, its intercostal spaces bulged somewhat, it gave a dull sound on percussion and yielded no respiratory sounds on auscultation. The right side was dull over the fourth and fifth ribs for a distance of three inches to the right of the median line; the other parts of this side had a normal resonance, but tubular breathing was heard in the lower lobe of the lung, coarse mucous râles in the middle and upper lobes and a slight friction sound near the angles of the fourth, fifth, sixth and seventh ribs; pulsation was very perceptible two inches to the right of the sternum, between the fifth and sixth ribs, and at this point the heart-sounds were most distinctly heard,—the first short, the second natural. The patient was treated with iron and quinine, bitartrate of potassa, squill, sweet spirit of nitre and opiates. At the end of a week his appetite was somewhat improved and the dyspnœa lessened; but after this he gradually failed, the dyspnœa increased, the bulging of the intercostal spaces became more marked and palpitation of the heart occurred in frequent paroxysms. He died August 19. *Post-mortem* examination: The left pleural cavity contained five quarts of bloody serum, while there remained of the lung only small, friable, shreddy portions of tissue adhering to the costal pleura and showing no indication of the presence of tubercular deposit. The right lung was healthy, but was adherent near the angles of the fourth, fifth, sixth and seventh ribs; the pleural cavity contained four ounces of yellow serum. The heart was so displaced that the right auricle lay beneath the fifth intercostal space and the apex pointed downward and to the right; the inner surface of the pericardium was roughened by fibrinous deposit and the sac contained four ounces of bloody serum; the walls of both ventricles were thin and flabby; the endocardium was healthy. The liver was enlarged and very pale; the spleen healthy. The kidneys, one-third larger than natural, were soft in substance and roughened on their outer surface.—*Ass't Surgeon Orin A. Horr, 114th Colored Troops, Brownsville, Texas.*

CASE 30.—Private John Clinton, 27th Colored Troops; age 23; was admitted Nov. 13, 1864, delirious and in an extremely prostrate condition from typhoid pneumonia. Three days after admission the delirium subsided; but the patient continued to sink, and died on the 20th. Opiates, stimulants, nourishing food and counter-irritation were employed in the treatment. *Post-mortem* examination: The right lung was normal; the lower part of the left lung was greatly congested, its surface dotted with coagulable lymph and bound to the thoracic parietes by numerous recent adhesions; the left pleural cavity contained a large quantity of serum. The heart and abdominal viscera were normal.—*Act. Ass't Surgeon W. H. Drury, Seminary Hospital, Columbus, Ohio.*

CASE 31.—Private Thomas A. Wilson, Co. A, 12th Tenn. Cav., was admitted Jan. 23, 1864. He died February 23. *Post-mortem* examination: The brain and its membranes were healthy. The right lung, twenty-two ounces, was adherent and contained softened tubercles in its upper lobe; the left lung was collapsed by eighteen ounces of turbid serum in the pleural cavity and its large bronchial tubes were inflamed and thickened. The heart contained large white clots. The spleen weighed fourteen ounces; the kidneys were soft and friable; the bladder contained an ounce of turbid urine. The other viscera were healthy.—*Act. Ass't Surgeon Wm. Stemmerman, Hospital No. 19, Nashville, Tenn.*

CASE 32.—Private Barney Gruber, Co. H, 23d Ky.; age 26; was admitted Jan. 18, 1862. He was decidedly fat, and was said to have been stout, healthy and fit for all duty one week before admission. He seemed apathetic and complained one day that he felt pain all over, and next day that he felt no pain at all; pulse about 120; tongue moist but covered in the centre with a thin white coat, red on the edges and tip; not the least appetite; not much thirst; some cough with a little thin, white expectoration; dulness over the lower part of the thorax. Diagnosis—bronchitis and probable pleurisy. The bowels were inactive and had to be moved every three or four days by mild purgatives; expectorant and antiphlogistic remedies were borne badly; mustard poultices over the entire thorax and fomentations under oiled-silk gave no relief. Stimulants were more agreeable, but did not mitigate the symptoms notably; we did not bleed nor blister him. The patient grew gradually weaker, and died quietly February 12. *Post-mortem* examination: The mucous membrane of the bronchial tubes was thickened and injected; the lower margin of the left lung was hepatized, but the remainder of the lung was permeable to air; the pleura was thickened throughout, partic-

ularly below, and contained about a gallon of inodorous brownish liquid. The pericardium and heart were normal. The liver was enlarged and fatty.—*Surgeon A. Strothotte, 23d Ky.*

Case 33.—Private Henry Stegman, Co. C, 146th Ind.; age 47; was admitted Aug. 12, 1862, having been sick for several weeks. His skin was hot and dry, tongue coated, pulse 120 and rather full; there was pain on pressure over the liver and spleen; the abdomen was tympanitic but not tender, nor did the patient suffer from diarrhœa; sudamina covered the abdomen and thorax and an occasional rose-colored spot was observed. On September 1 he had a sharp pain in the left side, with friction sounds anteriorly; pulse 120. A blister was applied. The patient had a large bedsore. Quinine and whiskey were prescribed. On the 4th the left side of the thorax was enlarged by pleuritic effusion. He died on the 6th. *Post-mortem* examination: The pia mater was injected and the arachnoid somewhat opaque near the vertex. A quantity of liquid was found in the left pleural sac and flakes of tough elastic lymph were firmly adherent to its lining membrane, especially over the lower lobe of the lung; the pulmonary substance was generally collapsed and non-crepitant, dark-colored, tough, flexible and of greater specific gravity than water; but a portion of the substance adjacent to that which sank in water, and apparently of the same character, was readily inflated. In the upper part of the lower lobe of the right lung, under the pleura, there was about half an ounce of very dark, mobile, frothy fluid, loculated but not sharply defined and having a peculiar odor; this lung was generally crepitant, but posteriorly and inferiorly it was somewhat congested and dark-colored. The right lung weighed fifteen and a half ounces, the left twenty-one and a half. The bronchial glands were slightly engorged. Fibrinous clots were found in both sides of the heart. The liver was flaccid and light-colored but presented some superficial ecchymosed spots; the spleen, nine ounces, was soft and light-colored; the pancreas flabby, pale and irregularly congested; the kidneys somewhat injected. The intestines were slightly discolored by bile, the stomach only presenting some appearances of congestion.—*Ass't Surgeon Geo. M. McGill, Hicks Hospital, Baltimore, Md.*

Case 34.—Private James J. Sanders, Co. K, 19th V. R. Corps, was admitted April 22, 1864, with chronic pleurisy, and died May 2. *Post-mortem* examination: The cavity of the chest contained four quarts of purulent liquid; the left lung, collapsed and coated with pseudomembrane, was completely broken down by suppuration—[*Specimen* 339, Med. Sec., Army Medical Museum]; the upper lobe of the right lung was inflamed.—*Act. Ass't Surgeon T. Cunningham, Sherburn Barracks Hospital, Washington, D. C.*

Case 35.—Private Michael Murphy, Co. B, 3d Mich.; age 20; was admitted Dec. 12, 1862, for epilepsy, having had five or six fits, while with his regiment, during the previous eight months. He was pale, weak and emaciated. On the 16th he went to bed complaining of a severe cold and sore throat; his skin was hot and pulse frequent, 145. Next day there was slight dulness with crepitant râles indistinctly heard over the lower lobe of the left lung, pneumonitic expectoration and pain, for which, on the 18th, a blister was applied. On the 20th the pulse fell to 108, the tongue became cleaner, the sputa less rust-colored; the patient felt much better, although the lung continued dull on percussion. Six days later he became suddenly worse, expectorating enormous quantities of matter of the color and consistency of custard; his pulse was 145 and very feeble; respiration 60, and the left side universally dull. He died February 1, continuing to the last to expectorate large quantities of custard-like matter. He was treated with carbonate of ammonia, milk-punch, beef-essence and a grain of blue-pill three times daily; quinine was subsequently given. *Post-mortem* examination: The brain exhibited no evidence of disease, but was much paler on the surface than usual. The heart was somewhat enlarged, mainly from a dilatation of the right ventricle, the walls of which were two lines thick; its cavity was filled with a large white clot; the pericardium contained about a gill of liquid. The right lung was healthy; the left lung, attached by its anterior border to the front of the chest, was completely collapsed, though the upper lobe was still pervious to air—[*Specimen* 341, Med. Sec., Army Medical Museum]; the back part of the pleural cavity was lined with a thick pyogenic membrane and contained several quarts of pus; another distinct cavity, lined with a similar membrane and containing half a pint of pus, existed in the lower part of the upper lobe; no tubercles were present; the bronchial mucous membrane was inflamed, but there appeared to be no inflammation of the tissue of the lung. The liver was large, light-brown and flabby; the gall bladder empty; the spleen large, dull-red and flabby; the kidneys normal. The mucous membrane of the ileum was more or less inflamed; the general redness was accompanied by one patch, about eighteen inches long, of intense redness, together with several large ecchymosed spots. The colon was moderately inflamed. The intestinal glands were healthy.—*Act. Ass't Surgeon J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 36.—Private Hugh T. Keys, Co. F, 116th Ill.; age 37; admitted March 6, 1864. Died 8th. *Post-mortem* examination: Right lung firmly adherent; left lung compressed by eighty-eight ounces of purulent serum and covered largely with lymph. Heart, ten ounces, soft, flabby, yellow. Liver and kidneys fatty; other organs normal.—*Hospital No. 1, Nashville, Tenn.*

Case 37.—Private Elijah Herd, Co. B, 5th Ky. (rebel); admitted Jan. 4, 1864. Died 16th. *Post-mortem* examination: Right pleura slightly adherent; left pleura strongly adherent behind and below, with a pint and a half of deep-yellow pus and a large mass of disorganized lymph in its cavity; lung collapsed. Pericardium inflamed and containing three ounces of serum. Intestines inflamed and mesenteric glands enlarged.—*Hospital No. 1, Nashville, Tenn.*

Case 38.—Private Marshall T. Johnson, Co. I, 140th Pa.; age 19; was admitted Aug. 22, 1863, complaining of slight cough and diarrhœa, weakness and loss of appetite. Quinine and tincture of iron were prescribed, with good diet and a mixture containing wild-cherry bark and morphia. He was found dead in bed on the morning of the 27th. *Post-mortem* examination: The left pleural cavity and the pericardium were filled with serous effusion; in the former there were also large masses of semi-organized lymph. The other viscera were healthy.—*Act. Ass't Surgeon M. Stovell, Hospital No. 1, Annapolis, Md.*

CASE 39.—Private George W. Benton, Co. F, 14th N. Y. Heavy Art'y; age 18; was admitted Dec. 27, 1864, as a case of pneumonia. He improved and was considered convalescent on Jan. 25, 1865; but on February 20 he was again taken with fever, pain in the left side and cough, which became increased during the course of the following day, when friction sounds were heard over the heart. The pain was less severe on the 22d, but the patient had some headache and œdema of the limbs. He had been treated with acetate of ammonia and sweet spirit of nitre; but on this day blue-pill with bicarbonate of soda was prescribed. Dyspnœa and cough were troublesome on the 23d, the latter being attended with an expectoration of glairy mucus. Tartar emetic, brandy and beef-tea were prescribed. The pain was much aggravated on the 25th and there was dulness over the left side. A blister was applied. An abscess pointed March 6, in the sixth intercostal space; it was opened on the 8th and discharged two quarts of pus. The patient died on the 12th. *Post-mortem* examination: The left lung was adherent anteriorly and coated with pseudo-membrane posteriorly: it was partly collapsed by the pus which had escaped through the perforation in the chest-wall. Between the fourth and fifth ribs pus had found its way through the intercostal muscles but had not reached the skin. The pericardium contained some purulent liquid, and both pericardium and heart were covered with tough layers of yellow lymph. [*Specimen* No. 521, Med. Sec., Army Medical Museum, shows the lung with the perforation through the chest-wall.]—*Act. Ass't Surgeon W. H. Combs, Emory Hospital, Washington, D. C.**

PLEURISY CONSECUTIVE TO MEASLES.—CASE 40.—Private Isaac David, Co. A, 81st Ohio; age 19; was admitted March 22, 1864, with measles. The eruption was slight; it made its appearance two days before admission and disappeared on the 24th. The patient had sore throat and cough with mucous expectoration. Senega, paregoric and sweet spirit of nitre were prescribed. On the 31st the patient was salivated, although he had been taking no mercurial: his throat continued sore and there was some diarrhœa, but the cough was somewhat better. On April 2 mucous râles were heard on both sides of the thorax; the patient suffered from pain in the bowels during the previous night and did not sleep well; his tongue was dark and coated and there was great nervous excitement. Extract of hyoscyamus was substituted for the senega mixture. Next day there was considerable febrile action, and on the 4th great nervous excitement, hoarseness and cough, but no diarrhœa. Turpentine emulsion was prescribed. On the 5th there was great dyspnœa, with a whistling sound in the larynx; the fauces were inflamed and a point of ulceration was observed. A blister was applied over the larynx. He was much better on the 8th, his appetite good and bowels regular, but on the following day he was seized with pain in both sides of the chest below the nipples; his cough was hacking and painful, sputa scanty, mucous and tenacious, respiration 48 and pulse 120. He died on the 10th. *Post-mortem* examination: The membranes of the brain were congested, but there was no effusion in them or in the ventricles; the superficial cerebral veins contained a number of free fibrinous coagula each about a quarter of an inch in length: the choroid plexus was soft. The right pleural cavity contained thirty-four ounces of sero-fibrinous effusion; the lung was compressed but not inflamed. The left pleura and lung were normal. The other viscera presented no marked lesion.—*Surgeon Francis Salter, U. S. Vols., Chattanooga Hospital, Tenn.*

CASE 41.—Private William H. Shafford, Co. C, 71st Ohio; age 18; was admitted March 12, 1864, with measles. The eruption was not well marked and disappeared soon after admission. Cough then became troublesome and he had four to eight loose stools daily. Senega, paregoric and sweet spirit of nitre were prescribed, with beef-tea and arrow-root. The diarrhœa continued, and on the 26th turpentine emulsion was substituted for the expectorant mixture. To this, on April 1, mercury with chalk, opium and ipecacuanha were added. Next day he was somewhat

*The following are abstracted from the serial medical literature of the period:—W. H. TRIPLETT, Woodstock, Va., in the *Richmond and Louisville Medical Journal*, Vol. V, 1868, p. 19, gives the following case of chronic pleurisy treated by paracentesis and injections:—John H——, a farmer, but at the time of the origin of his malady a Confederate soldier, was attacked by pleurisy of the left side early in 1863. After this he suffered from a severe cough, and was under treatment in hospital at Winchester, Va., from whence he was sent to his home. He was much emaciated and enfeebled and his respiration, which was always quick, was readily disturbed, physical exertion or hasty movements causing great dyspnœa. When the case came under observation, two and a half years after its commencement, the pulse was 100 and feeble. The circumference of the affected side was three inches greater than that of the other at corresponding levels. Its intercostal spaces were distended and the dulness over its whole surface extended two inches to the right of the median line. The displaced heart pulsated at a point corresponding with the right nipple. An unnatural fulness of the epigastric and left hypochondriac regions was also present, and no respiratory sounds were detected in the left lung. Night-sweats were profuse, and the general condition of the patient was becoming worse rather than better. In September, 1865, paracentesis was performed between the fifth and sixth ribs with Flint's apparatus, and twelve pints of reddish-looking serum mingled with pus corpuscles were removed. The operation greatly relieved the patient, whose heart was found beating beneath the sternum, but no respiration was heard in the left lung. Five weeks after this the fluid had reaccumulated with renewed suffering to the patient. A second operation brought away a quantity of liquid equal to the first, but of a purulent and offensive character; and every other day thereafter three or four pints of offensive pus were drawn from the chest. The patient again suffered from profuse night-sweats, and the case seemed approaching a fatal termination. Tonics and stimulants, with animal diet, were administered. The pleural cavity was washed out with a weak solution of acetate of lead, but as this did not reduce the purulent discharge an injection was employed consisting of two drachms of tincture of iodine and half an ounce of chlorinated soda solution in a pint of tepid water. Every other day the proportion of iodine was increased until it reached one ounce to two of water. Under this treatment the discharge assumed a healthier character and was reduced to half a pint a day; the patient's strength began to improve, he gained in flesh, and his voice became full and strong. Finally, the local treatment consisted of washing out the pleural cavity with warm water and then throwing into it a pint of tepid water holding in solution two grains of sulphate of zinc to the ounce. When the latter was evacuated at the end of forty-eight hours it was found little affected. After each injection the patient was rolled from side to side to promote the contact of the liquid with every portion of the diseased surface. The history of the case terminates five months after the first operation with the statement that the left lung remained unchanged.—Lieut. Henry H. Carter, Co. A, 26th Ind., had suffered from an attack of acute pleurisy for four months before he was first seen by M. T. CLELAND, Kewana, Ind. The patient's pulse was 120, respiration so difficult that a lying posture could not be assumed, countenance [illegible] and extremities cold and edematous; there was dulness over the left side with unusual fulness of the intercostal spaces; the heart was displaced three inches to the right of its normal position, and its action was so violent as to shake the body of the patient. The removal of a gallon of [illegible] liquid, by puncture between the [illegible] ribs, at once relieved the urgency of the symptoms. The discharge continued for five days, after which the [illegible] was [illegible] and at no time was it found necessary to withdraw more than a pint and a half. A second operation removed [illegible] gallons of pus. A tent was introduced and a tonic and supporting treatment pursued. In October, 1864, when the case was reported, the patient was able to ride out in a buggy. He was gaining strength and [illegible] without appetite.—*Cincinnati Lancet and Observer*, Vol. VII, new series, 1864, p. 65.

better, and on the 4th the diarrhœa was checked, but the patient complained of pain in the right side below the nipple. Sinapisms were applied. The cough became aggravated, the expectoration muco-purulent, the respiration hurried and the pulse small, rapid and feeble. Death on the 8th was preceded by stupor. *Post-mortem* examination: The membranes of the brain were congested but there was no liquid in the ventricles. Both pleural cavities contained serum and lymph, in all thirty-four ounces. The lungs were coated with coagulable lymph; their parenchyma was normal, but the bronchial mucous membrane was red and thickened. The trachea was full of mucus. The right ventricle of the heart was distended with white fibrinous clots; the left was empty. The stomach contained half a pint of dark-green liquid; its mucous membrane was thickly covered with mucus. The kidneys were normal in size; there was no difference in color between their cortical and medullary substance.—*Ass't Surgeon Theodore A. McGraw, U. S. Vols., Chattanooga Hospital, Tenn.*

CASE 42.—Private E. J. Powell, Co. K, 180th Ohio; age 18; admitted Feb. 5, 1865, with intense fever, dyspnœa, red eruption on face and congestion of fauces, tonsils, mouth and tongue. 6th: Eruption of measles on body and lower extremities, with abatement of fever and continuance of dyspnœa; thick, bloody, tenacious sputa, very difficult to remove from mouth and throat; dulness of left side and bronchial respiration. 14th: Died. *Post-mortem* examination: Strong adhesions of left lung posteriorly with pseudomembrane elsewhere, and thirty-six ounces of yellow flocculent serum in the cavity; bronchial tubes red and injected.—*Douglas Hospital, Washington, D. C.*

CASE 43.—Private Henry Bates, Co. A, 31st Ohio; age 19; admitted March 25, 1864, from barracks with measles. Died April 1. *Post-mortem* examination: Extensive bronchitis in both lungs; thirty-two ounces of liquid in left pleural cavity. Other organs normal.—*Hospital No. 1, Nashville, Tenn.*

CASE 44.—Private Larcom McCann, Co. F, 10th East Tenn. Cav.; age 18; admitted Jan. 27, 1864, with measles, from which he recovered; attacked with mumps, from which also he recovered. March 19: Sudden delirium; pain in the left side, gradually becoming worse. He was treated for remittent fever. 24th: Died. *Post-mortem* examination: Arachnitis; one ounce of liquid in ventricles. Pericarditis; six ounces of liquid in pericardium. Left lung compressed in lower lobe by the pericardial effusion; both lungs coated with recent lymph and twenty ounces of serum in each pleural sac. Liver much congested. Other viscera normal.—*Hospital No. 8, Nashville, Tenn.*

CASE 45.—Private David Garland, Co. B, 13th East Tenn. Cav.; age 36; admitted Feb. 4, 1864, with measles. Died March 16. *Post-mortem* examination: Recent pleuritic adhesions on left side. Heart weighing nine ounces; liver forty-one ounces; spleen three ounces and a half; kidneys each four ounces and a half—all healthy. Lower ileum congested in patches; large intestine presenting several small ulcers.—*Hospital No. 1, Nashville, Tenn.*

II.—CONSUMPTION.

PREVALENCE, ETC.—During the five and one-sixth years covered by the statistics 13,499 cases were reported among the white troops under the heading *Consumption* in the Tubercular Order of Constitutional Diseases; and of these 5,286 terminated in death. The average annual rates per thousand of strength were 6.1 and 2.2, respectively. This number of cases includes an unknown but certainly large percentage of individuals whose consumptive tendencies were so marked at the period of enlistment that they should not have been received into the service. On reaching their regiments from the recruiting depots their names were placed on the sick report by the regimental medical officers, and proceedings were instituted to effect their discharge. Carelessness on the part of recruiting officers added considerably to the statistics of consumption. But, on the other hand, the reported number fails to show many of the cases in which consumption was truly a development of the hardships and exposures of military life. Men were taken sick with diarrhœa and dysentery, continued fevers, measles, bronchitis, pneumonia and other diseases, and their cases were reported under these headings. Months afterwards they died or were discharged on account of tubercular disease of the lungs, although their names had never appeared in the list of those taken sick with consumption. Thus is explained the apparent inconsistency of the statistical records of consumption, which show 13,499 cases with 5,286 deaths, and 20,103 discharges among the white troops. Deducting the deaths from the cases, there remain 8,213 consumptives available for discharge; but the actual discharges were 12,190 in excess of this number. This excess permits some idea to be formed of the number of men in whom tubercular disease was developed during the progress of their military service. It consisted of the cases that supervened on other diseases and were treated in and discharged from the

general hospitals. The cases that ended fatally in the hospitals may also be properly credited as a result of the war,—for, as a rule, the regiments were relieved of their consumptive recruits by discharge, not by death. There were, therefore, at least 12,190+5,286=17,476 cases of consumption that may be accepted as truly resulting from the exposures, fatigues and privations of the war.

But these numbers by no means indicate the extent to which tubercular disease pervaded our armies. Tubercle was frequently found in the lungs of men who died of other diseases. Thus, in 30 of 435 cases of pneumonia and in 16 of 330 cases of the paroxysmal and continued fevers, in which *post-mortem* observation was directed to the condition of the lungs, these organs were found to be tuberculous. According to Dr. WOODWARD, tubercular deposits were observed in the lungs in 106 of 667 cases of diarrhœa and dysentery.* The pulmonary complication in many of these undoubtedly antedated the diarrhœal attack, but in others, and particularly in chronic cases, it is probable that the protracted intestinal disease favored the development of the pulmonary tubercle.† If the proportion of tuberculous lungs found by *post-mortem* investigation in cases of diarrhœa and dysentery be assumed to have existed in the whole number, 37,794, of white soldiers who died of these intestinal disorders, no less than 6,000 of them would have to be considered tuberculous.

Among the colored troops the reported cases numbered 1,331, the deaths 1,211,—equal to the respective annual rates of 7.2 and 6.3 per thousand of strength. Deducting the deaths from the cases, there were left for discharge or other disposition 120 consumptives, the actual number of discharges having been 592. The relatively large number of deaths among the colored troops has already been explained as due to their homeless condition during the war period.‡ Their discharge would have deprived them, in most instances, of the only home they had in which to die.

The lines indicating monthly variations in prevalence—diagram facing page 828,—are of little value, as they are of necessity drawn from the reported cases. The records do not furnish data for the distribution by months of the 12,190 cases that supervened on other diseases among the white troops or the 472 similar cases among the colored troops. The rates for the white commands were higher from the beginning of the war to March, 1863, than during the subsequent months. The height of the line during the former period appears to show the influence of the irregularities at the recruiting depots. The army of the United States attained its maximum strength, under the calls of the President for troops, in the month stated. The lower level of the remainder of the line may be regarded as that proportion of the reported cases which was truly due to the exposures of active service. The irregularities of the line expressing prevalence among the colored troops appear also to be more intimately connected with the enrollment of the men than with their subsequent exposures.

The CLINICAL RECORDS consist of eighty-five fragments, which, with few exceptions, present little of interest. *Cough*, for instance, is very generally noted, and, as the cases had usually made considerable progress before reaching the hospital where the record was written, it is frequently characterized as *severe* or *harassing*. The *expectorated matters* are also noted as *scanty*, *frothy*, *mucous*, *white* or *tenacious*, but more generally as *copious*, *free*, *muco-purulent*, *yellow* or *purulent*, and each of these is not unfrequently qualified as *streaked*, *stained*, *tinged* or *mixed with blood*. In two cases the presence of *tubercular matter* in the sputa is asserted. The *site of pain*, as in the *upper part of the chest*, is frequently men-

* Part Second of this work, p. 565. † Ibid. page 578. ‡ Ibid. page 579.

tioned, but its character seldom. The *physical signs* occasionally noted were *diminished resonance in the infraclavicular region extending downward, with enfeeblement of the respiratory murmur and prolongation of the expiratory sound*, and *absence of vesicular respiration* followed by *bronchial breathing, crackling, mucous râles, cavernous respiration* and *gurgling*. The *pulse* was reported *frequent* or *frequent and feeble*. *Palpitation* and *dyspnœa* also appear in the records with *emaciation* and *debility*, caused by *fever, cough, loss of sleep, diarrhœa* and *perspirations*. *Heredity* is mentioned with some frequency, and occasionally there is a reference to the *limited capacity of the chest, infraclavicular depression* and *aphonia*. *Fistula in ano* caused much irritation in one case in which, after some hesitation, an operation was performed, the official record closing with the patient's discharge three months afterwards. An amelioration of the symptoms occurring soon after the arrival of a case in hospital is occasionally ascribed to improved hygienic conditions.

The disease is mentioned as having been developed after attacks of *pneumonia, measles, diarrhœa, dysentery, typhoid* and *malarial fevers*. The cases terminated in discharge or death. In one case only was the patient returned to duty, but, as shown by the regimental records, he did not continue long in a serviceable condition:

Corp'l Gilbert Alexander, Co. C, 108th Ill.; age 20; was admitted Sept. 23, 1863, with consumption. He was pale and emaciated; had hectic fever, night-sweats, nocturnal cough, yellow, blood-streaked sputa, darting pains through the chest, shortness of breath and excitable pulse. Under cod-liver oil, whiskey and full diet he improved, regaining his appetite and flesh. His cough had entirely disappeared, when he was returned to duty Feb. 16, 1864.—*Hospital, Quincy, Ill.* [This man returned to his regiment about the middle of March, 1864, from hospital at St. Louis, Mo., having been absent in various hospitals about twelve months. He was reported as fit for duty; but, after exposure at night, he complained of violent headache. This was relieved by means of an active cathartic; but another day's duty produced a relapse with listlessness. He complained of little except the headache. He was taken into the regimental hospital and treated with mercurial and saline purgatives, an antiphlogistic regimen and blisters to the spine and nape of the neck. No improvement resulted. As the powers of the system seemed failing, quinine and stimulants were employed. The left side became paralysed, and three days later, March 30, 1864, the patient died, coma having supervened in the meantime.]

The three special cases submitted below are by some member of the staff of the Satterlee hospital, Philadelphia, Pa.*

Private David T. Billings, Co. B, 2d Me.; age 27; born in Maine of healthy parents; was admitted Aug. 12, 1862, with intermittent fever contracted on the Chickahominy. His thorax was well developed and his general appearance presented no suspicion of the tubercular diathesis. Under the administration of quinine his febrile paroxysms were averted. On November 12, when the officer who makes the report took charge of his case, he was taking fifteen drops of tincture of iron and two grains of quinine three times a day. He complained of excessive debility and a slight hacking cough accompanied by a dumb ague, which caused an aggravation of his malaise and cough every third day. Dulness was found over the upper lobe of the right lung, with prolonged expiration and bronchial breathing, but no crackling or râles. Over the upper lobe of the left lung a slight friction sound was audible. The matter expectorated was slight, nummular and increased on every third day. The secretions were generally normal, but occasionally he had nocturnal perspirations affecting the upper part of the body. The iron and quinine were continued with the addition of cod-liver oil and counter-irritation. On the 25th he was seized with violent hæmoptysis, which recurred for ten days, always on the day of the expected paroxysm. This was controlled by veratrum viride with aromatic sulphuric acid. On December 8 some crackling was audible in the right side, the left lung being in its normal condition. Cough was increased and there was some purulent expectoration. The intermittent malaise persisted, with an increased cough on the day of the suppressed paroxysm. Quinine was ordered in increased doses—ten grains at one dose for three consecutive mornings; after that ten grains every seventh day for four weeks, and lastly, the same dose twice repeated after the lapse of fourteen days. Under this treatment the patient improved rapidly. On Jan. 7, 1863, on account of the weak and rapid action of the heart, the tincture of iron was resumed in doses of ten drops three times a day, and on the 10th the hæmoptysis returned and the cough increased, but showed no intermittency in its character. Quinine and iron were now omitted, and under cod-liver oil, counter-irritation and favorable hygienic influences the improvement in the patient's condition became marked. On February 1 the dulness, prolonged expiration and crackling had entirely disappeared, and the cough and expectoration were but trifling. His general condition had so improved as to lead to the belief that recovery was probable. As the lung affection disappeared *pari passu* with the removal of the malarial symptoms, the reporter regards this and other similar cases as

* The record of these cases is unsigned. Act. Ass't Surgeon L. K. Baldwin was, at the time of their entry, the attending physician of Ward R of the Satterlee hospital, in which these patients were treated.

tending to show that in the cachectic condition of the blood consequent upon malarial poisoning certain physical signs manifest themselves in the lungs, coinciding in every way with the usual concomitants of tuberculosis. He believes that these local conditions would finally end in tuberculosis, and that they resemble those conditions which are found in other organs, the liver, spleen and kidneys, as the consequence of malarial poisoning. He says:—"Under the use of the remedies generally employed in miasmatic affections they yield most readily, and it is to this circumstance that we may owe, perhaps, the beneficial employment of arsenic, which has been extolled as a remedy by some writers in incipient tuberculosis. The error which most writers and practitioners have fallen into in reference to tuberculosis originates in the fact that the formation of tubercle is always considered by them as due to a peculiar cachexia of a specific character. Recently some writers have described a scrofulous induration, and stiffening of the summit of the lungs simulating tuberculosis and giving rise to many of the physical signs of that malady. I believe that there are various conditions of the blood in which a local engorgement, if not properly treated, may finally give rise to tubercular formations, and in cases where there is no hereditary taint and where the usual characteristic prodromes of a tubercular cachexia are wanting. Under modern enthusiasm for the unusual in pathology we seem to overlook the fact that the blood is the fluid tissue and the tissues are solidified blood. A local pathogenic process may contaminate the blood as well as a depraved blood-disease the tissues which it is to constitute. These facts should not be overlooked in our diagnosis and treatment of tuberculosis. In the cases to which reference has been made the malarial blood-contamination may have depraved a portion of the lung, and this focus of disease may have served to keep up the cachectic condition. Remedies which antagonize the blood poisoning would not ensure a return to health: the local complications must also be removed. In many cases of supposed tuberculosis, where all attention has been previously paid to the constitutional symptoms, I have effected a cure only by adding a local treatment."

Joseph Reading; age 25; born in New Jersey of healthy parents; was seized with remittent fever from exposure on the Chickahominy, and was two months in a hospital near Washington previous to his transfer to this hospital Dec. 12, 1862. On admission he was exceedingly emaciated, with flabby muscles but with a fine thoracic conformation. He complained of having paroxysms of fever, preceded by a slight rigor every other day, with a very annoying cough and considerable expectoration of a purulent character occurring with perspiration as soon as the fever subsided. A slight hæmoptysis had occurred about two weeks before his entry, and he had been informed by his previous medical attendant that his case was one of incipient phthisis. There was dulness over the upper lobe of the right lung, with prolonged expiration and much gurgling audible in front of the clavicle: there was also some dulness over the upper lobe of the left lung, with a jerking sound on expiration. Cardiac action was tumultuous and with an anæmic murmur: the pulse averaged about 96, but during the paroxysms of the fever it reached 120 per minute. The treatment consisted of generous diet, quinine (as given in the case of Billings), cod-liver oil and milk-punch, with the external application of tincture of iodine. On Jan. 1, 1863, the malarial complication was effectually removed, but the pulmonary symptoms remained about the same. To meet the anæmic complication tincture of iron in doses of fifteen drops three times a day was added to the treatment, but, as on the 6th, he complained of considerable stricture over the chest, and on that day had a return of hæmoptysis, which yielded to the influence of veratrum viride and aromatic sulphuric acid, the use of the iron was suspended. "He has improved rapidly since then: his cough has much diminished: there is but slight expectoration and it has lost its purulent character. Physical examination revealed, on the 25th, an almost entire disappearance of the dulness over the upper lobe of the left lung and also of the gurgling sound heard over the summit of the right lung: the prolonged expiration continued in that lung with dulness on percussion, but a wonderful alleviation had undoubtedly taken place. The patient has continued to improve and gives every evidence of returning health: his cough and expectoration have entirely disappeared, while the emaciation and debility consequent upon his illness remain. I have no doubt but that, with rest and proper care, he will eventually recover. In this case there was no evidence of any scrofulous cachexia, and the patient's whole affection seemed to have resulted from the malarial influence."

George A. Case: age 25: born in New York State of healthy parents, contracted intermittent fever on the Chickahominy in June, 1862, and was admitted into hospital on August 10. At an examination of the patient, November 12, the following points were noted: Considerable emaciation; dingy appearance; well-developed thorax: strongly incurved nails, well-marked red line around the gums; shortness of breathing, the slightest exercise bringing on violent cardiac palpitations with an anæmic blowing sound: two attacks of hæmoptysis since the beginning of his sickness: pulse about 90: he has paroxysms of coughing which he thinks are aggravated every second day: with a slight purulent expectoration often streaked with blood: no chills, while such slight perspirations as occur are confined to the upper portion of the body: some dry crackling over apex of left lung: increased dulness and increased respiration over apex of right lung; expiration prolonged and jerking. Thinking that there might be still some malarial affection which, if removed, would enhance the patient's chance of recovery, quinine was given as in the case of Billings, and was supplemented with cod-liver oil, generous diet and the external use of tincture of iodine. The patient improved rapidly and the paroxysmal character of the cough entirely disappeared: but finding, about December 20, that the excessive irritability of the heart and the blowing sound continued, iron in the form of Vallet's mass, three grains three times a day, was prescribed. On Jan. 6, 1863, the iron was discontinued on account of extreme stricture felt by the patient over the chest with an increase of bloody expectoration and some slight febrile action. Cups were applied to the spine and the quinine and cod-liver oil were continued. On the 9th the patient's condition was thus stated: Dulness diminished; gurgling ceased; slight cough continuing with a little mucous expectoration but no bloody streaks; flesh and strength returning rapidly.

The object of the Satterlee report is in recording these latter cases, to which, he says, he might have added the histories of four others of a similar character, was to suggest that they

tended to subvert the doctrine of a pathogenic antagonism between the causes of miasmatic diseases and the tubercular development. He continues as follows:

These cases, from their symptoms and the signs yielded by physical exploration, induce a medical man to view them as veritable cases of incipient tuberculosis. On the other hand, the unusual venosity of the blood in malarial affections, a circumstance pointed out by ROKITANSKI as proving an obstacle to the formation of tubercle, seems to militate against the view assigning to these cases a tubercular origin, and to require that they be attributed to those venous congestions causing hypertrophy and œdematon of the spleen and lungs as the result of malarial poisoning. It might be suggested that the administration of the iron in these cases had proved advantageous by relieving the engorgement of the lungs. It is well known that TROUSSEAU'S experience has led him to eschew chalybeate remedies in the treatment of confirmed phthisis, he having become convinced that in such cases they promote a tendency to hæmoptysis and increase the inflammatory process around the tubercle, hastening its ultimate softening. The writer, attributing the hæmoptysis and the aggravation of the symptoms to the iron administered, immediately suspended its use. Should further experience prove the iron to act in this manner, it would tend to strengthen his view as to the tubercular nature of the disease as well by confirming the views of TROUSSEAU as by a consideration of the efficiency of the iron as a blood remedy in that condition of deterioration which produces enlargement of the liver, spleen and other glandular organs. He considers that the conditions of the system in malarial poisoning are just such as would induce tuberculosis, general prostration of the system and debilitation of the blood—the body being thus deprived of the proper material for the maintenance of its nutritive and the continuance of its organic functions.

These cases assail the doctrine enunciated by BOUDIN, that the vitiation of the blood by the miasm of malarial fever is, within limits, preservative against tubercular development.* At the same time they raise a question as to the value of iron in those lung diseases that are attended with hæmoptysis.

In addition to these three cases there is, among the eighty-five cases constituting the clinical records of consumption, but one instance in which this disease is said to have been present in a malarious subject.

Private Andrew L. Lingers, Co. B, 24th N. J., was admitted Dec. 18, 1862, convalescing from intermittent fever, and troubled with night-sweats and a cough with copious sputa, for which quinine and iron were administered, and pitch and iron plasters applied in sequence to the chest. On the 26th a slight dulness was found under the right clavicle and jerking respiration at the apex of the left lung. On Feb. 5, 1863, the dulness was greater under the left than under the right clavicle. Cod-liver oil was ordered. He progressed slowly, at one time seeming to improve and at another to grow worse, until the record of April 3 shows him free from cough on that particular day, although there were pains in the left side of the chest, dulness in its upper third, harsh and jerking respiration at its summit and posteriorly, with prolonged expiration and occasional crepitus, while the respiratory murmur on the right side was feeble. He was discharged on the 14th for debility and probable phthisis.—*Satterlee Hospital, Philadelphia, Pa.*

The *post-mortem* records of consumption make occasional mention of chills and febrile movement in their statements of the ante-mortem condition of the patients, but it is doubtful whether these were of a malarial nature. In six cases the evidence of the malarial presence is more definite, although by no means convincing; but the attending physicians certainly regarded some of these cases as malarial, and their opinion is of value, although

* J. C. M. BOUDIN, Paris, 1842—[illegible] maintained: subject to the generally received opinion that the progress of tubercular disease of the lungs is hastened by low temperatures and moisture, *i. e.*, by climate, and retarded by a residence in localities having a warm and equable temperature; and proposed the doctrine that there is an antagonism between the paludal poison and the tubercular cachexia,—that the vitiation of the blood by the pathogenic matter of marsh fevers gives, within certain limits, an immunity from tubercular disease. M. BOUDIN took credit to himself for having developed this law of antagonism. He claimed that not heat, nor cold, nor moisture, nor latitude, etc., will explain the absence of tubercular disease in certain localities; but that it is connected with emanations from the soil. In Algeria, in the delta of the Rhine and in the Italian maremma, where fever is rife, consumption is rare; and at Naples, Malta, Gibraltar and Corfu, which are free from fever, thoracic diseases are common. He mentions the case of a consumptive who, with two attendants, removed from the north of Europe to Hyères, where shortly afterward his health became re-established, and [illegible] de l'un et donne la fièvre aux autres." But Dr. W. C. WELLS broached this subject long before BOUDIN wrote his treatise. On Dec. 11, 1812, he read a paper *On Pulmonary Consumption and Intermittent Fever chiefly as diseases opposed to each other*, before the Society for the Improvement of Medical and Chirurgical Knowledge. In this, which was published in the *Transactions of the Society*, London, 1812, p. 471, he cites several instances to prove that where agues are prevalent consumption is comparatively rare, and that the decrease of agues in a locality has been followed by an increase in the number of consumptives. He explained this by assuming that the existence of one disease in the human body—or even a tendency to one disease—often renders it less susceptible to the attacks of another disease than if it were free from all morbid impressions. He recommended that the children of consumptive parents be sent to schools in the fenny districts; but the evidence on which this recommendation was made was purely hearsay. It was stated, on the authority of [illegible] were low, marshy and infected with agues. On the other hand, the experience of Dr. L. H. WARD, at the Seamen's hospital "*Invalidenhaus*," opposed to [illegible] II, 1864, p. 483.

there may be no record of the facts on which it was based. It is difficult to disprove M. BOUDIN's doctrine of antagonism by direct evidence, because the doctrine acknowledges exceptional cases, and all testimony advanced for its refutation is subject to challenge as exceptional if it cannot be thrown aside by impeaching its malarial character. It is well known that our troops broke down with tubercular disease in malarious as well as in non-malarious localities, and the following case shows that the assumed antagonism did not always prevent the coexistence of the diseases in the individual:

Private John Ingraham, Co. C, 17th U. S. Inf.; age 23; was admitted Nov. 23, 1863, and died on the 26th. *Post-mortem* examination: The body was not much emaciated. The right lung weighed thirty-three ounces; the anterior portion of the first and the whole of the second lobes were healthy; the apex of the first lobe was the seat of tubercular deposit, affected in part with calcareous degeneration, and the posterior basilar portion of the same lobe was tubercular and of an intense purple color,—the deposit had gone on to softening and to the formation of a cavity about the size of a horse-chestnut; the third lobe was œdematous, friable, noncrepitant and of a dark-purple color. The left lung weighed twenty-four ounces and adhered to the costal pleura; its posterior portion was of a purple color and contained softened tubercle; but there was no tubercle in the apex. One of the bronchial glands on this side was tuberculous. The heart was normal and contained fluid blood. The liver was bronzed; the spleen firm and of a dark-mahogany color; the kidneys congested. The stomach was enormously distended—filled with a muddy-green fluid. The mucous membrane of the intestines was intensely congested; there was no ulceration nor were the patches of Peyer elevated, but the solitary follicles of the small intestine were conspicuous and of a deeper purple color than the adjacent membrane.—*Ass't Surgeon H. Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

If *post-mortem* appearances be of value in determining the cause of death this man died of malarial fever. Indeed, had the record of this case come under the observation of the editor at an earlier period of his work, it would have added one to the comparatively few cases of death from acute malarial poisoning that have been submitted. The testimony as to the coexistence of tubercle is equally positive. It may be said, however, that BOUDIN's view of the antagonism did not imply a reciprocal protection, but was limited to the prevention of consumption by malaria. But, since he refers to the recovery of a consumptive when taken to a malarious locality,* and since a removal to a malarious region, as originally urged by WELLS,† is the practical application of the doctrine, it is important to know that this exposure is not unattended with danger. If the *post-mortem* records of the paroxysmal fevers are examined, thirty-seven cases (including seven with a possible typhoid element) will be found in which attention was specially directed to the condition of the lungs. Tubercle was observed in five of these cases, to wit: 61, 69, 84, 89 and 98. If the case of Ingraham, just submitted, be included, pulmonary tubercle was recorded in six of thirty-eight malarial cases. Tubercle was noted also in four of fifty-eight cases of continued malarial fever and in one of fifty-one cases of typho-malarial fever‡ in which the condition of the lungs was recorded. In all there were eleven cases of tuberculosis in one hundred and forty-seven malarial subjects whose lungs were examined after death from febrile accessions. But since there was but one case of pulmonary tubercle in thirty-four cases of pure typhoid fever§ in which the lungs were inspected, it must be inferred that the presence of the tubercular cachexia afforded no protection against the influence of the malarial miasm.

The records afford no precise data bearing on the endemicity of consumption: but American experience, aside from that of the war, suffices to show the fallacy of the doctrine of antagonism. Although the inhabitants of many malarious localities are singularly free from tubercular disease, a glance at the records of the Health Office of New Orleans, La., will show that both diseases must be regarded as prevailing in that city to an unusual extent. Its malarious site and surroundings do not prevent it from having a higher death-rate from consumption than most of our large cities; its rate is exceeded only by those of New

* See note, page 822, *supra*. † See last note. ‡ *Supra*, page 430. § *Supra*, page 430.

York and Boston.* It is probable, therefore, that the frequently observed want of endemic coincidence is due to a nonconcurrence of the causative conditions rather than to an antagonism on the part of the diseases or the miasms or germs which give rise to them.

Although the propriety of administering iron in tubercular disease of the lungs has been questioned by TROUSSEAU, COPLAND, STILLÉ and others,† their objections to its use do not appear to be sustained by the experience of the war, notwithstanding the cases submitted from the records of the Satterlee hospital. The administration of iron in eleven of the eighty-five cases constituting the clinical records of consumption was not followed by the occurrence of hæmoptysis: in three of these the iodide was given and in eight the tincture of the sesquichloride. On the other hand, hemorrhage was noted in eighteen of the cases, and in only six of these had there been a prior use of the preparations of iron; in three the hæmoptysis occurred two or more weeks after the tincture was used, and in three—the Satterlee hospital cases—the iron was charged with having occasioned this complication. In twelve there had been no antecedent administration of iron; but, on the contrary, in four of the twelve the hemorrhage was said to have been successfully treated by the persulphate or muriated tincture. In only one of these was there a recurrence after the iron was used, and here the alarming symptoms were suppressed by a continuance of the remedy.‡ The *post-mortem* records, as a rule, do not enter into the particulars of the clinical history. There are, nevertheless, among them twelve cases in which hæmoptysis is recorded, and one which was characterized by profuse and repeated hemorrhages from the nose and gums; but in only one of these is iron said to have been given, and in this instance the untoward symptom preceded its administration.

The charges preferred against the chalybeate preparations in cases of phthisical hæmoptysis cannot be considered sustained; but from the fact that iron was not employed in many of these pulmonary hemorrhages it may be inferred that there was a restriction on its use in our army practice.

*The following tabulation, comparing the death-rate of Malarial Fevers and Consumption in some large cities of the United States, compiled from Reports published in the *Bulletin of the National Board of Health*, Vols. II and III, illustrates this point:

City.	Population.	Total mortality from—				Annual rates per 1,000 of population.			
		Consumption.		Malarial fevers.		Consumption.		Malarial fevers.	
		1880.	1881.	1880.	1881.	1880.	1881.	1880.	1881.
New Orleans, La	216,140	845	850	332	356	3.91	3.93	1.54	1.65
Boston, Mass	362,535	1,469	1,541	6	7	4.05	4.25	.02	.02
New York, N. Y	1,206,577	4,741	5,302	466	605	3.93	4.39	.39	.50
Brooklyn, N. Y	566,689	1,807	1,121	250	304	3.19	2.98	.44	.54
Philadelphia, Pa	846,980	2,692	2,758	16	57	3.18	3.26	.02	.07
Baltimore, Md	332,190	1,243	-------	83	-------	3.74	-------	.25	-------
Cincinnati, Ohio	255,708	738	900	10	21	2.89	3.52	.03	.08
Chicago, Ill	503,304	848	1,134	81	128	1.68	2.25	.16	.25
St. Louis, Mo	350,522	784	902	236	387	2.23	2.57	.69	1.10
San Francisco, Cal	233,956	788	581	35	9	3.37	2.48	.14	.04

†TROUSSEAU—*Clinical Medicine*—Translation by Sir J. ROSE CORMACK, Vol. V, New Sydenham Society, London, 1872, p. 97—asserts that the administration of iron to persons having a tendency to tubercular disease sometimes gives an appearance of flourishing health, which is, however, immediately followed by a violent and rapidly fatal activity of the hitherto latent constitutional disease. COPLAND, in his *Dictionary of Practical Medicine*, Vol. III, London, 1858, p. 1150, says that the preparations of iron are contraindicated in the treatment of phthisis when inflammatory complications or a tendency to hæmoptysis are present; and that whenever, during their employment, the cough becomes hard and the respiration oppressed they should be discontinued. TANNER, in his *Practice*, London, 1872, p. 573, and STILLÉ, *Therapeutics and Materia Medica*, Vol. I, Philadelphia, 1874, p. 480, hold similar views. Many writers do not refer to this subject: Among them may be mentioned EBERLE, 1835; DUNGLISON, 1844; BENNETT, 1863; AITKEN, 1866; REYNOLDS, 1871; WATSON, 1872; RUEHLE in *Ziemssen's Cyclopedia*, 1875, and BRISTOWE, 1876. LOOMIS, New York, 1884, restricts the use of iron in phthisical subjects to anæmic cases in which the temperature is below 100° Fh. FLINT, Philadelphia, 1884, p. 221, denies that chalybeate tonics favor the recurrence of hæmoptysis in phthisical cases, and holds that even had they this effect it might be evidence for, rather than against their utility.

‡ATKINSON—*Transactions Med. Society, State of Pennsylvania*, 1863, p. 298—speaks with high favor of the persulphate of iron in the treatment of hæmoptysis. In his experience in public and hospital practice its employment never failed of success. He considers it trustworthy, also, in hemorrhage from other organs, as the stomach and bowels. It was given in doses of five to ten drops every twenty or thirty minutes until the discharge was checked, after which it was continued for several days in less frequent and diminished doses.

THE POST-MORTEM RECORDS.—From these it appears that our medical officers entertained the views of LAENNEC, which regarded tubercle as of two varieties, the gray or miliary and the crude, yellow or cheesy, the latter originating by the aggregation of the former or at times by infiltration. In many of the records may be found descriptions which tally with VIRCHOW's caseation of lobular exudations in the air-cells and pulmonary connective, and the formation of cavities by its subsequent softening and elimination; but these deposits were uniformly regarded during the war as tubercular. Selections from the records are herewith submitted.

Twenty-five cases of pulmonary tubercle unsoftened, softened or in process of elimination were recorded. As for instance:—

CASE 1.—Private Daniel Burdickson, Co. I, 28th Colored Troops; age 19; was admitted Dec. 7, 1864. He was debilitated; he slept a great deal, and his mind was dull. About Jan. 3, 1865, his cough became very distressing and the sputa thick, mucous and occasionally bloody. He died on the 15th. At the *post-mortem* examination tubercles were found in both lungs and pleuritic adhesions on the left side.—*L'Ouverture Hospital, Alexandria, Va.*

CASE 15.—Private Aaron Wyght, Co. I, 6th N. H.; age 40; admitted May 27, 1864, with much debility and emaciation, diarrhœa, cough, œdema of lower extremities, and with dulness, tubular respiration, prolonged expiration and marked infraclavicular depression on both sides. He walked about up to June 17, apparently improving under cod-liver oil, tonics, stimulants and good diet, but on that day he fainted and died in a few hours. *Post-mortem* examination: Tubercular infiltration and cavities in both lungs; much mucus in bronchial tubes; pleuritic adhesions on both sides posteriorly. No clots in heart.—*Chester Hospital, Philadelphia, Pa.*

CASE 25.—Serg't John Fadeley, Co. F, 13th Va.; age 26; treated in field hospital for four months; was admitted Nov. 5, 1864, much emaciated, but with appetite good and bowels regular: Cough harassing; expectoration copious, tubercular and purulent; dulness over the left lung; cavernous respiration; a large abscess in the perinæum, pointing towards the scrotum and yielding a free purulent discharge. 19th: Diarrhœa profuse, exhausting. 24th: Involuntary stools. 25th: Died. *Post-mortem* examination: Emaciation extreme. Left lung transformed into a sac filled with pus similar to the sputa; right lung infiltrated with tubercular deposits in various stages of development,—those in the apex softening. Abdomen not examined.—*Cumberland Hospital, Md.*

Four cases of pulmonary tubercle with attempts at cretefication were recorded as follow:—

CASE 26.—Private Robert L. Bennett, Co. D, 11th Ill., was admitted May 3, 1865, from Sherman's army by way of New York: Cough with expectoration of a dark purulent matter; emaciation; no pain; no night-sweats; appetite fair; pulse 100; pectoriloquy under both clavicles, on the right extending four inches downwards; gurgling under the middle of the sixth rib on the left; respiratory murmur puerile over the lower portions of both lungs. 22d: The sound under the right clavicle was like that of a steam escape-pipe; expiration was twice as long as inspiration; tympanitic resonance over upper lobes and dulness over lower lobes: respiratory murmur almost inaudible: pulse 120; occasional delirium. 23d: Died. *Post-mortem* examination: Complete pleuritic adhesion on both sides. Two large cavities in upper lobe of right lung, one immediately under clavicle, the other four inches below, each as large as a hen's egg, and communicating, of irregular shape and roughened interior; lower lobe congested. A large cavity in left lung involving nearly the entire upper lobe; several cavities the size of filberts, a few cretaceous deposits half an inch in diameter, and occasional patches of miliary tubercle in the lower lobe, the lower margin of which was congested. Black clots in the heart and three ounces of straw-colored fluid in the pericardium.—*Act. Ass't Surgeon A. A. Morrison, Hospital, Madison, Ind.*

CASE 27.—Serg't William H. Crow, Co. D, 114th Ohio; admitted Aug. 25, 1863, with phthisis pulmonalis: Pulse 90 to 100; slight cough and expectoration; great prostration; little appetite. He became gradually weaker, and died on the 30th. *Post-mortem* examination: Lung-tissue healthy except lower lobe of left lung, which contained much tubercular matter, some of which was hard and cretaceous, some cheesy and some broken down into pus: there was also a large vomica containing pus and dark grumous liquid. Heart healthy.—*Hospital, Madison, Ind.*

CASE 28.—Private Louis Danner, Co. K, 20th Conn.; admitted March 11, 1864, with chronic pulmonary disease and feeble heart. Died 15th. *Post-mortem* examination: Body much emaciated. Left lung universally adherent, enormously enlarged and containing darkly mottled melanotic tubercle cretefied; no serum in pleural cavity: right lung similarly conditioned but not to so great an extent: the lower portion nearly healthy: four ounces of dark-yellow serum in pleural cavity. Pericardium contained eight ounces of serum of a clear light-straw color; heart half the normal size, walls thin, atrophied and fatty, anterior surface gelatinous, but no pericarditis; valves thickened, especially the mitral, and covered with fibrinous deposits.—*Hospital, Tullahoma, Tenn.*

CASE 29.—Private William F. Browning, Co. D, 5th Tenn.; age 20; admitted Sept. 11, 1864, with chronic bronchitis: Pulse 100; tongue slightly coated: thirst, anorexia and some tendency to diarrhœa: clearness on percussion: moist râles; labored respiration: aphonia and frequent cough with expectoration of tough mucus. He failed gradually, and died December 4. *Post-mortem* examination: Great emaciation. Pleuritic adhesions on left side: calcareous tubercles filling both lungs; muco-purulent matter in smaller bronchial tubes. Abdominal viscera normal.—*Act. Ass't Surgeon H. C. Newkirk, Hospital, Rock Island, Ill.*

Death in the majority of these twenty-nine cases was the result of the tubercular destruction of the lungs and the concurrent prostration of the system. In forty-two cases, however, inflammatory or pseudo-inflammatory congestions and exudations, with more or less implication of the pleura, sometimes the rupture into it of tubercular abscesses, aided in cutting short the history of the individual, as in the following:

CASE 41.—Private James Johnson, Co. D, 39th Colored Troops; age 22; was admitted Oct. 16, 1864, with rheumatism. He performed light duty about the ward for some time, but on December 5 had a bilious attack from which his recovery was so unsatisfactory that on the 30th his case was considered one of typhoid fever. The febrile symptoms were, however, obscure,—there was diarrhœa with umbilical pain, feeble pulse, moist tongue, slight but constant cough and copious expectoration. Dulness was noticed, Jan. 4, 1865, over the upper and anterior part of the right lung. He died suddenly on the evening of the 6th, on retiring to bed after having been to the close-stool. *Post-mortem* examination: The right lung was much congested and infiltrated with tubercle; the left was hepatized gray. The heart was small and both its ventricles were empty. The liver appeared healthy. The ileum and colon were considerably inflamed and distended with gas.—*Summit House Hospital, Philadelphia, Pa.*

CASE 48.—Private John Anderson, Co. F, 18th Mo.; admitted Sept. 22, 1863, having suffered for six months from lung disease: Much emaciated—weight reduced from 180 to 100 pounds; copious muco-purulent sputa; gurgling râles in right lung posteriorly and comparative absence of respiratory murmur over both lungs. Died 26th. *Post-mortem* examination: Extensive tubercular infiltration of both lungs, but especially the right; hepatization, purulent infiltration and many abscesses; pleuræ adherent posteriorly.—*Union Hospital, Memphis, Tenn.*

CASE 57.—Private Israel Young, Co. E, 1st Va. Art'y; age 18; admitted Feb. 4, 1865, much emaciated. Died 10th. *Post-mortem* examination: Pleuritic effusion in right sac; right lung compressed, adherent at apex and to diaphragm, filled with vomicæ; left lung tuberculous.—*Third Division Hospital, Alexandria, Va.*

CASE 67.—Private William Toss, Co. B, 114th Ohio; age 18; was taken sick about March 1, 1863, with what was called remittent fever. 21st: Admitted. 23d: Died. *Post-mortem* examination: Abscess in apex of left lung, communicating with pleural sac; much tubercular deposit in both lungs.—*Lawson Hospital, St. Louis, Mo.*

CASE 68.—Private Balthaser Ginder, Co. C, 6th Conn., was admitted from Richmond, Va., March 24, 1864, with pneumonia of the right side. He complained of diarrhœa, general weakness and wakefulness; he coughed and expectorated a good deal of yellowish-gray matter tinged with blood, but had no pain; his pulse was regular and not much accelerated; his skin moist. Muriate of ammonia was administered. After a day or two he began to improve and continued to do so until April 2d, when the attending physician, hastily summoned at 4 P. M., found him pale and ghastly, with difficult respiration, accelerated pulse and bubbling sounds in the right side of the chest. Brandy was given, but he became several times faint, and died at 11 P. M. *Post-mortem* examination: The right lung was bound in part by old adhesions but was not much collapsed; its upper lobe was infiltrated with tubercle in various stages of softening; some cavities in the apex contained viscid yellowish tubercular masses, and one, larger than a goose's egg, in the middle of the lobe, communicated with the pleural cavity. The upper lobe of the left lung was also infiltrated and presented some small vomicæ, but none of them communicated with the pleura. The heart was smaller than normal, flaccid and pulpy; it did not contain any coagulum. The blood was discolored, thin and serous.—*Ass't Surgeon H. Loewenthal, U. S. Vols., Hospital No. 1, Annapolis, Md.*

CASE 69.—Serg't John Donagan, Co. K, 4th U. S. Inf.; age 27; was admitted Jan. 12, 1865, in the last stages of consumption. The physical signs indicated the affection of both lungs,—metallic tinkling was heard on the right side. He died February 2. *Post-mortem* examination: The larynx and trachea contained a considerable quantity of purulent liquid. The right lung, forty-eight ounces and a half, was studded with tubercle and had a large cavity in the anterior part of its lower lobe, communicating by an opening with the cavity of the pleura, which contained fourteen ounces of a purulent liquid slightly mixed with blood. The left lung, thirty-eight ounces and a half, had a large cavity in its apex; its lower lobe was studded with miliary tubercle. Both ventricles of the heart and the right auricle contained large, firm, fibrinous clots; the left auricle contained a small quantity of very black fluid blood. The spleen was somewhat softened and weighed twelve ounces. The liver, kidneys and mesenteric glands were normal in appearance.—*Act. Ass't Surgeon H. M. Dean, Lincoln Hospital, Washington, D. C.*

CASE 70.—Private Solon Herring, Co. H, 15th Tenn.; age 26; admitted Oct. 20, 1864. He had no known hereditary taint, but had suffered from cough, expectoration and night-sweats at intervals from early youth. In July, 1864, having exposed himself to a draught while perspiring, he experienced pain in both sides of the chest and dyspnœa. On admission the subclavian region on the right was highly resonant, on the left dull; the posterior right scapular region was dull, while the left gave a cracked-pot sound; harsh, deep, sonorous râles were heard on the right side, but on the left the respiratory murmur was almost imperceptible; there was a friction sound over the heart synchronous with its beating. He became emaciated, suffered from hectic, and died December 23. *Post-mortem* examination: Right lung somewhat emphysematous, apex puckered and containing miliary tubercle; left lung, hollowed into a cavern the size of a large cocoanut, communicating with the pleural cavity and containing two quarts of pus. Pericardium thickened and containing six ounces of serum, cardiac portion roughened by shaggy lymph. Liver adhering slightly to the diaphragm, which was adherent to the lung above.—*Act. Ass't Surgeon W. Matthews, Hospital, Rock Island, Ill.*

In a large number of cases diarrhœa or dysentery contributed to the fatal result, although

the record does not affirm the invasion of the intestinal membrane by the tubercular deposit. These may be found among the *post-mortem* records of diarrhœa and dysentery. A few cases that escaped observation when those records were published constitute cases 72–80 of the series at present under consideration.

In certain cases the tubercular infection was manifested by developments in other organs than the lungs and bronchial glands. The mesenteric glands were said to have been affected in cases 81–87; the great emaciation in some of these, as 85–87, was considered worthy of special note. In others, as 88–94, the intestines were the seat of tubercular deposits and ulcerations, which, in the last-mentioned case, perforated the ileum and caused death by peritoneal inflammation.

In some instances, 95–104, the spleen, or the spleen and liver or other abdominal viscera, were involved in the tubercular manifestations without the stated existence of peritoneal inflammation; and in two cases, 105, 106, the peritoneum itself was said to have been tuberculous, although there is no mention of diffuse inflammatory associations; in 106 the tubercular deposit on the serous coat of the intestine is said to have caused ulceration of the muscular tunic and thickening of the subjacent mucous layer. But in most of the cases of general abdominal invasion, 107–121, inflammation of the peritoneum was developed and often constituted the immediate cause of the fatal event. In some the abdominal viscera were soldered into a large conglobate tumor, as in 117–121; in the last-mentioned case the intestinal contents escaped into the peritoneal cavity: but although the intestine appeared to have been perforated in 120, there was no leakage of its contents on account of the closeness of the adhesions and the firmness of the adventitious membranes.

In other cases, 122–128, the brain or its membranes were known or suspected to have participated in the morbid processes. In others again, as 129–133, affections of the cervical, axillary or inguinal glands, and of the bones and joints, manifested the constitutional nature of the disease; in the last-mentioned case the lungs were unaffected. Lastly, a few cases, apparently of acute general tuberculosis, are presented: In 134 the symptoms were merely those of anæmia: in 135 intermittent fever, in 136 remittent fever and in 137 typhoid fever were suggested by the symptoms; but in 138, in which the tubercular manifestations were mainly confined to the lungs, the pulmonary symptoms were clearly defined.

Case 134.—Private Hiram Magoon, Co. F, 2d Ill. Light Art'y; age 19; was admitted Jan. 28, 1865, much emaciated from chronic diarrhœa, contracted while within the enemy's lines. Chalk mixture, catechu and logwood were employed with brandy-punch, and about February 10 the diarrhœa became checked; but the patient continued weak although every organ of the body seemed to be performing its function. He was several times examined for lung disease by different medical officers, but there was no sign of tubercular invasion. He appeared simply anæmic and had some exaggeration of the respiration. Iron and stimulants were administered, but he did not improve. He died suddenly March 9. *Post-mortem* examination: The pleural surfaces were closely adherent and presented many scattered abscesses; the lungs were crowded with miliary tubercles, but no abscess or vomica was found. The peritoneal cavity contained ten ounces of serum; the liver was enlarged and adhered by fibrinous bands to the diaphragm; the mesenteric glands were much enlarged from deposit of cheese-like matter; the other abdominal viscera appeared healthy.—*Act. Ass't Surgeon W. Kempster, Patterson Park Hospital, Baltimore, Md.*

Case 135.—Private Thomas Stewart, Co. F, 8th Colored Troops, was admitted Feb. 22, 1864, with two gunshot wounds of the integuments of the lumbar region. These healed satisfactorily; but about two weeks after admission the patient was seized with chills of an intermittent character, for which quinine and stimulants were administered. Two weeks later the chills recurred and were followed by night-sweats, which yielded to quinine and opiates. During the whole of his illness there was no alarming or troublesome symptom except loss of appetite and a progressive weakness and emaciation, apparently due in part to defective assimilation. Death occurred May 11. *Post-mortem* examination: The heart was smaller than usual. The lungs and liver were studded with tubercles. The spleen, thirteen ounces, contained many large masses of unsoftened tubercular matter [*Specimen* 632, Med. Sec., Army Medical Museum]. The peritoneum was studded with tubercles and its cavity contained two quarts of serum. The stomach, gall-bladder and pancreas were healthy. The small intestine was dilated and the transverse and descend-

ing colon contracted to three-fourths of an inch in diameter; otherwise the intestines were healthy.—*Ass't Surgeon E. D. Buckman, U. S. V., Hospital, Beaufort, S. C.*

CASE 136.—Serg't J. H. Montcalm, Co. L, 14th N. Y. Cav.; age 25; was admitted June 22, 1863, having suffered from the 2d with recurring hæmoptysis; he had also had irregular chills and some febrile movement with considerable prostration. Quinine in five-grain doses twice daily, tincture of iron, brandy, wine and morphine were prescribed. At first the patient was supposed to have remittent fever; but it soon became evident that he was tuberculous, although the pulmonary symptoms were slight. He died by asthenia August 9. *Post-mortem* examination: Both lungs were filled with isolated tubercles, some of which had undergone softening; but there were no cavities.—*Act. Ass't Surgeon Austin Flint, Ladies' Home Hospital, New York City.*

CASE 137.—Private Abram Gardner, Co. K, 128th N. Y.; age 26; was admitted Nov. 4, 1862, with typhoid fever, and died on the 16th. *Post-mortem* examination: Tubercular deposits were found in the lungs. The stomach and small intestine were normal; the mucous membrane of the ascending colon was much congested.—*Ass't Surgeon C. H. Andrus, 128th N. Y. Vols., Stewart's Mansion, Baltimore, Md.*

CASE 138.—Private Michael Corcoran (alias Coughlan), 1st Mich. Cav., was admitted June 27, 1864, immediately after having had a hemorrhage from the lungs. During the two days following admission he had several attacks of pulmonary hemorrhage, losing in all over two quarts of blood. He had no cough, and weighed about one hundred and eighty pounds; but his mother, he said, had died of consumption. Shortly after admission tubercle was recognized at the apex of the left lung. The disease ran a rapid course; both lungs became involved in front and behind. He lost fifty or sixty pounds in weight during his illness. Death occurred August 27. *Post-mortem* examination: Both lungs adhered firmly to the walls of the chest and were filled with crude tubercle; the left was more extensively diseased than the right and had a cavity in its apex. [A section of the lower lobe of this lung forms *Specimen* 404, Med. Sec., Army Medical Museum.]—*Act. Ass't Surgeon David L. Haight, Douglas Hospital, Washington. D. C.*

TREATMENT.—The method of treatment generally adopted embraced the administration of cod-liver oil, tonics and stimulants, with extra or generous diet, warm clothing and exercise when admissible. The oil was frequently given with whiskey, generally after meals, the largest dose prescribed being half an ounce of the former to one of the latter three times a day. Among the stimulants employed were whiskey, brandy-punch, milk-punch, sherry wine, wine-whey, beer and porter. The preparations of cinchona, and the iodide, citrate and muriated tincture of iron were the tonics most frequently used. Other remedies were occasionally administered when called for by the necessities of the case.

Febrile exacerbations in malarious subjects were treated by liberal doses of quinine, but when the pyrexia was referred to local processes nitrate of potash and Dover's powder, citrate of potash or acetate of ammonia, with or without aconite, were the remedies used; sometimes tartar emetic was exhibited in small doses as prescribed in pneumonia.

For restlessness and cough at night some opiate was given, frequently Dover's powder, paregoric or morphia, or the opiate was prescribed in conjunction with other remedies. Muriate of ammonia was occasionally given, and also chlorate of potash.

The injurious effects of constipation were met by the use of castor oil, small doses of calomel with rhubarb or jalap, blue-pill, compound cathartic or compound colocynth pills. Diarrhœa was treated by opium with or without chalk, catechu, tannin, acetate of lead, sulphate of copper, nitrate of silver, etc.;, enemata of laudanum were frequently given in severe cases. Aromatic sulphuric acid was sometimes employed to control diarrhœa, but more frequently to suppress colliquative sweats, in which case it was usually associated with quinine.

The internal medication of hæmoptysis consisted of veratrum viride, dilute sulphuric acid or the muriated tincture or persulphate of iron.

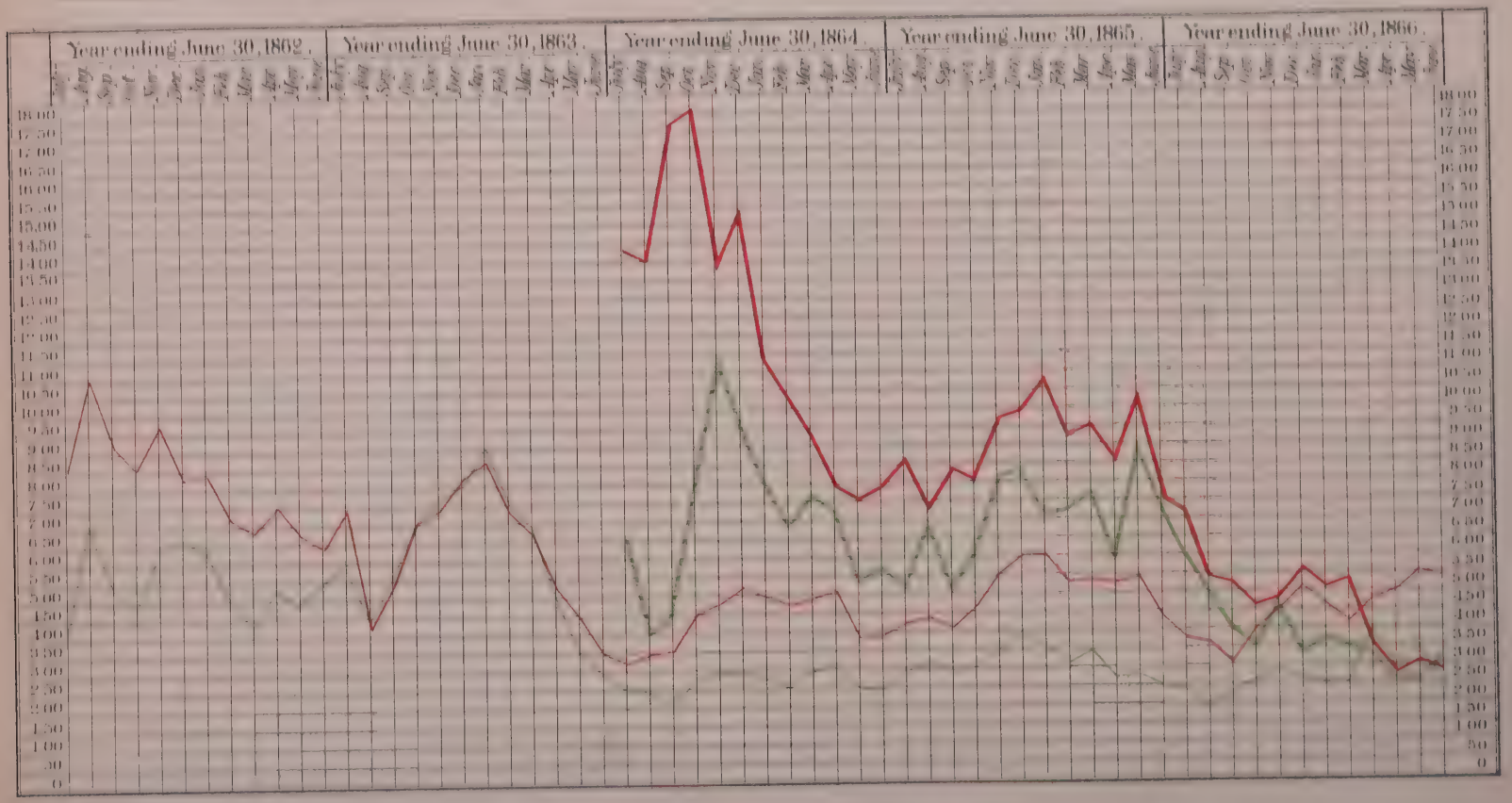
When the vital powers began to fail recourse was had to carbonate of ammonia, usually with quinine, and the free use of alcoholic stimulants.

Among the external applications employed, according to the requirements of the individual case, were wet and dry cups, emollient cataplasms, iron, pitch and conium plasters, sinapisms, tincture of iodine, croton oil and cantharides. Iodine with chloroform and alcohol was used by inhalation at Rock Island prison hospital.

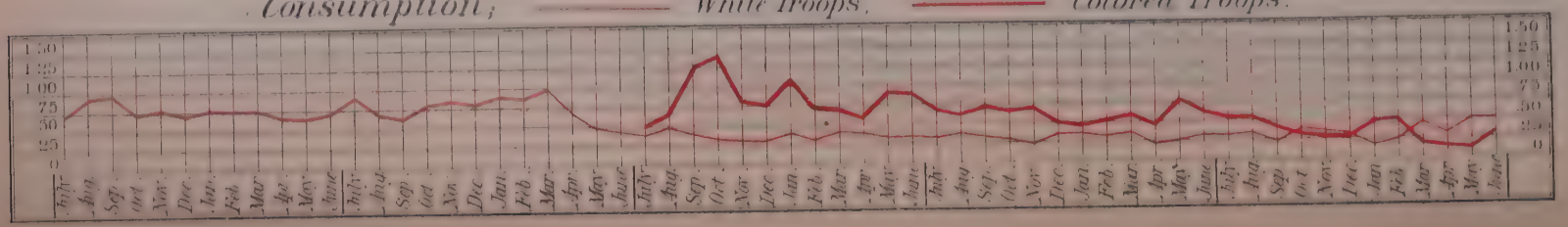
Diagrams showing the Monthly Variations in the Prevalence of Acute and Chronic Rheumatism and Consumption among the White and the Colored Troops, expressed in Rates per Thousand of Strength.

Acute Rheumatism; } *White Troops.*
Chronic Rheumatism;

Acute Rheumatism; } *Colored Troops.*
Chronic Rheumatism;


Year ending June 30, 1862.
Year ending June 30, 1863.
Year ending June 30, 1864.
Year ending June 30, 1865.
Year ending June 30, 1866.

Consumption; *White Troops.* *Colored Troops.*



III.—RHEUMATIC AFFECTIONS.

I—ACUTE RHEUMATISM.

A priori reasoning leads to the conclusion that acute rheumatism must have been a disease of frequent occurrence among our troops during the war. Its connection with cold and dampness—a connection which explains its greater frequency among the poorer than the wealthier classes of civil life—suggests its frequency among men who were so often unsheltered and otherwise unprotected as our soldiers on active service. If the statistics could be accepted without question, this anticipation might be regarded as fulfilled. Acute rheumatism was credited with 145,551 attacks among the white troops during five and one-sixth years—a number equal to 65.3 cases annually in every thousand men, and with 18,399 cases among the colored troops during the three years of their service—a number equal to 100 cases annually per thousand of strength.

But Ass't Surgeon LEHLBACH, 7th N. J., after a series of campaigns with the Excelsior Brigade, regarded as a popular error the opinion that acute rheumatism was a prevalent disease among our troops on active service.

Certain it is, he says, that we often see regiments exposed to damp, wet, cold, sudden and violent changes of temperature, and obliged to sleep on wet ground with but scant protection, and no cases of acute rheumatism follow.*

If the reported figures be accepted at their face value, Dr. LEHLBACH's experience must have been exceptional. But was it so? or did the acute rheumatism of the Monthly Reports include cases that were not veritable cases of rheumatic fever? The statistics themselves offer some evidence on this point. The fatal cases among the white troops numbered 283, among the colored troops 98, a fatality of .2 and .53 per cent., respectively. If LOOMIS be correct in his assertion that three per cent. is the average death-rate in acute rheumatism,† the cases reported as acute rheumatism by our medical officers were not all cases of acute articular rheumatism. Even if all the fatal cases of endocarditis and pericarditis—109 and 250, respectively, among the white troops, and 22 and 65 among the colored troops—be charged to the account of acute rheumatism, the average death-rate of the disease would be raised to only .44 per cent. among the white and 1.0 per cent. among the colored soldiers. It is probable, therefore, that the reported cases include a large number of slight or subacute attacks in the progress of chronic cases and of those acutely painful but apyrexial forms of so-called muscular rheumatism known as lumbago, pleurodynia, etc.

Acute rheumatism shows in its monthly rates a greater prevalence in that period of the war during which new levies were sent to the field than later, when these levies had become inured to the hardships of active service;—the decided fall in the rates during the early months of 1863 may be thus explained. Slightly marked seasonal variations may be observed in the line of prevalence among the white troops, the minima extending over the months of June, July and August. Irregularities in the line of prevalence among the colored men appear connected rather with the exposure of new troops than with seasonal changes.

Few CLINICAL or POST-MORTEM RECORDS of acute rheumatism have been preserved. The following are submitted:

CASE 1.—Private Patrick Hughes, Co. G, 28th Mass.; admitted Jan. 24, 1862: Quiet but sleepless; back less painful; ankles still swollen and sore; pulse accelerated; skin somewhat hot; tongue slightly coated. Treatment continued. 25th: Slept but little on account of pain; ankles slightly swollen but very painful; left knee almost well,

* *Medical and Surgical Reporter*, Phila., Vol. XI, 1864, p. 236.

† Page 860 of his *Practical Medicine*.

but right knee hot, swollen and painful: pulse accelerated: skin hot: tongue moist and comparatively clean. A drachm of sulphate of magnesia and ten grains of nitrate of potash five times a day, with light diet. 26th: Rested well: both knees hot and somewhat swollen, but the right only painful: ankles sound: tongue slightly coated: pulse 80. Continue treatment. 27th: Rested well: pain only in the left knee, which is enlarged from effusion: pulse about 60, very irregular: skin hot: pain in the region of the heart. Continue nitrate of potash with colchicum. 28th: Rested well: appears well: pulse regular: tongue slightly coated: complains of pain in his left crotch, otherwise well. Continue treatment. May be returned to quarters to-morrow.—*Hospital 28th Mass.*

Case 2.—Private John Goodwin, Co. I, 28th Mass.: admitted Jan. 24, 1862: Tongue thickly coated with white fur; pulse not particularly accelerated but full; slept better last night: feet and ankles swollen but no longer painful: right knee less swollen and less painful: left knee worse. Continue light diet. 25th: Spent the night poorly on account of pain in left knee: ankle and right knee well; swelling generally disappearing except in left knee: pulse regular; tongue white-coated, tipped with red. A drachm of sulphate of magnesia and ten grains of nitrate of potash five times a day; light diet. 26th: Spent the night comfortably; pulse regular: tongue slightly white and coated: left knee painful, somewhat swollen and hot; other joints unaffected. Continue treatment. 27th: Slept well: no pain, but a sensation of weakness in knees. Continue treatment. 28th: Rested well: tongue somewhat coated: pain and swelling gone. Returned to duty.—*Hospital 28th Mass.*

Case 3.—Private William White, Co. A, 4th Pa. Reserves: age 32: was admitted Aug. 19, 1862, with diarrhœa. On November 8 he had fever, headache, coated tongue and pain in the joints. Wine of colchicum with opium was given every three hours; Dover's powder at bedtime; tincture of iodine and flaxseed poultices to the joints. Next day a dose of sulphate of magnesia was given. On the 10th pain, inflammation and fever were lessened. On the 11th the patient was free from fever, and on the 12th the articular swellings were subsiding. Next day the fever returned; pulse frequent and feeble; less swelling. Discontinued iodine and poultices: gave a half ounce of solution of acetate of ammonia every three hours. On the 14th the fever had subsided: the tongue was cleaning: the pulse stronger: appetite good. The acetate was disused on the 22d, but the colchicum was continued in doses of thirty drops until March 6, when iodide of potassium was substituted; compound tincture of cinchona was given during part of the time. On the 9th the patient was considered cured, but he was retained on light duty in the ward until September 4, when he was transferred to the 2d Co. 1st Batt. Invalid Corps.—*Satterlee Hospital, Philadelphia, Pa.*

Case 4.—Serg't William Copps, Co. D, 88th Pa., was admitted July 26, 1863, with acute rheumatism. He had suffered from previous attacks of this disease. On admission: Fever; pain in the left leg and back and some swelling of the ankle and knee: pain in the left breast and palpitation; tongue slightly coated; bowels constipated. Gave one and a half ounces of sulphate of magnesia and half an ounce of sweet spirit of nitre in two ounces of water,—to take a tablespoonful every two hours until the bowels are moved; afterwards ten grains of Dover's powder every six hours. 28th: Pain in back and leg; palpitation intermitting; less fever: pulse 90: appetite better. Apply fly-blister, 4 by 6, to back; dress with olive oil. Gave three drachms of acetate of potash and one ounce of sweet spirit of nitre in two ounces of water,—to take a tablespoonful every six hours. 30th: Appetite good; bowels regular; pain in leg; less pain in back. August 1: Pain in breast. Gave three grains of sulphate of quinine in an ounce of whiskey three times daily. 6th: Pains in chest and back; much palpitation; appetite good: bowels regular. 7th: Palpitation at intervals; great nervous prostration. Gave one-twentieth of a grain of strychnine three times daily. 9th: Less palpitation; much pain in back and limbs. Gave one drachm of iodide of potassium in one ounce each of wine of colchicum and water,—to take one fluid drachm three times daily. 15th: Much better: pain in back and limbs relieved: some palpitation on exertion. Stopped treatment. On duty as nurse. September 14: Returned to duty.—*Second Division Hospital, Alexandria, Va.*

Case 5.—Private Alexander Moore, Co. F, 69th Pa.; age 52: was admitted April 5, 1864, having been suffering from rheumatism while at home on furlough. Knees and wrists swollen and painful: swelling extending from knees down the legs. Four grains of Dover's powder every three hours: beef-tea; wrapped limbs in cotton. 9th: One drachm of laudanum, one and a half drachms of wine of colchicum and two drachms of Rochelle salt in six ounces of water,—to take a tablespoonful every three hours: packed the limbs with lint soaked in solution of bicarbonate of soda, half an ounce to a pint of water. 12th: Swelling much reduced: slight pain in præcordia but no change in sounds. Applied three wet cups, drawing about an ounce and a half of blood. 15th: Increased colchicum; gave a bottle of porter daily. 19th: Five grains of iodide of potassium three times a day. 24th: Added one ounce of laudanum to the pint of alkaline solution for external use. 26th: Swelling and pain much diminished. May 1: Two drops of tincture of aconite every three hours. 15th: Swelling of arms returning. June 1: Arms and hands œdematous: applied moderate pressure with bandages. 7th: Ten drops of tincture of iron three times a day. 13th: Swelling somewhat reduced: applied tincture of iodine externally, to be repeated every second day: warm bath. 23d: Gave two grains of quinine three times a day. 26th: Sitting up: much better. July 28: Regaining use of arms slowly: wrists somewhat stiff. Transferred to 16th and Filbert streets.—Diagnosis—acute rheumatism. November 1: Furloughed. 21st: Returned from furlough. 29th: Transferred to Haddington.: Diagnosis—chronic rheumatism. February 18, 1865. Discharged because of chronic rheumatism causing distortion and deformity of joints of fingers of both hands and left knee-joint.]—*South street Hospital, Philadelphia, Pa.*

Death was generally due to an implication of the heart: in case 7, however, it appears to have resulted from erysipelas and pneumonia. In case 8[*] of the records of pneumonia the fatal lung affection supervened on acute articular rheumatism.

[*] See *supra*, page 779.

CASE 6.—Private Jesse Rice, Co. E, 14th Va.; age 20; was admitted Sept. 23, 1863, with pain in the chest, cough and occasional bloody expectoration. On Feb. 3, 1864, he was attacked with acute rheumatism, the knee-joints becoming painful and swollen. On the 5th, as the condition of the knees improved, his feet and ankles became swollen and he was seized with cardiac pain and dyspnœa, while friction sounds were heard on auscultation. These symptoms continued with increasing gravity and much restlessness, and on the 11th the friction sounds were obscured by pericardial effusion. He gradually sank, and died on the 26th. *Post-mortem* examination: The lungs were compressed; the lower lobe of the right lung was hepatized and adhered to the diaphragm. The left pleura was adherent to the pericardium, which was thickened, covered with plastic lymph and distended with forty ounces of turbid serum. The abdominal viscera were healthy.—*Cumberland Hospital, Md.*

CASE 7.—Private G. S. Runyon, Co. F, 90th N. Y.; age 24: was admitted Aug. 29, 1864. He had much fever and his wrists and ankles were swollen, painful, tender and doughy. Small doses of Rochelle salt and morphia were given every four hours, and tincture of iodine used as a local application twice daily. He continued with little change until September 2, when the pulse, still rapid, became weak, and fluctuation was detected over both wrist-joints; there were also many small abscesses in the subcutaneous tissue of the face and chest. Brandy was prescribed. Next day sordes appeared on the teeth, the tongue became dry and brown, the throat dry, parched and somewhat inflamed, deglutition difficult, respiration disturbed and the expectoration rust-colored, while slight dulness was found over the right lung and lower lobe of the left lung. On the 4th erysipelas was developed on the face; pulse 130, feeble; abscesses continued to form. Tincture of iodine was applied to the erysipelatous patch, and a pill of iron and quinine given four times daily. Next day he was worse; low delirium had developed: respiration 30: skin cold and clammy; pulse almost imperceptible; erysipelas spreading. He died on the morning of the 7th. *Post-mortem* examination: The wrist-joints were filled with purulent matter: on incising the integuments of the arm at various points pus escaped from the subcutaneous tissues. There were slight pleuritic adhesions on both sides; the right lung was congested; the lower lobe of the left hepatized. The aortic valves were somewhat congested. The liver was normal in size, nutmeg in appearance, softened and easily broken down; the spleen enlarged, softened and degenerating into pus; the kidneys healthy; the stomach and intestines distended with gas.—*Hospital, Frederick, Md.*

CASE 8.—Private John Buck, Co. G, 7th Wis., was admitted March 19, 1865, with rheumatic fever. On April 4 he had diarrhœa and gastric irritation. Two days later dyspnœa was added to his symptoms and his countenance became anxious; the action of the heart was tumultuous, the area of cardiac dulness increased and the pulse small, irregular and intermittent. Death occurred on the 8th. *Post-mortem* examination: The pericardium, which was thick and opaque, contained six ounces of serum and lymph; the endocardium was injected: the chordæ tendineæ in the right ventricle showed some adherent fibrin; the left ventricle contained a fibrinous clot.—*Act. Ass't Surgeon J. H. Brownlow, Harewood Hospital, Washington, D. C.*

CASE 9.—Serg't William P. Tragansee, Co. A, 1st Conn. Cav.; age 24: was admitted Dec. 2, 1863, with diphtheria. He was improving under quinine and chlorate of potash internally, the latter being also used, alternating with nitrate of silver, as a local application, when he was attacked with acute rheumatism, the knees and elbows being specially affected. He stated that he had been subject to attacks of this kind all his life. Saline cathartics were employed and the patient seemed in a fair way to recovery, when, on the 22d, he was seized with sharp cutting pains in the bladder and side, and died half an hour afterwards. *Post-mortem* examination: An enormous pericardial effusion with some adhesion was found: the heart was coated with an irregular layer of lymph.—[*Specimen* 214, Med. Sec. Army Medical Museum.]—*Act. Ass't Surgeon B. B. Miles, Jarvis Hospital, Baltimore, Md.*

CASE 10.—Henry Roberts, colored; age 28: was admitted Dec. 29, 1865, with articular rheumatism, the elbows, wrists and knees being affected. Subsequently symptoms of heart disease set in; he became dropsical, and died in April, 1866. *Post-mortem* examination: The areolar tissue of the body was loaded with serum, as was also the peritoneal cavity. The right lung weighed thirty-six ounces, the left forty-two ounces: both were hepatized in their lower parts. The pericardium contained twenty-three ounces of liquid: heart and pericardium weighed fifty-two ounces.—the heart, after the removal of the pericardium and clots, weighed thirty-five and a half ounces: the aortic valves were ulcerated.—[*Specimen* 801, Med. Sec., Army Medical Museum.]. The liver was fatty and somewhat cirrhosed: the right kidney showed a singular cicatrix on its outer edge: the left was lobulated.—[*Specimen* 802.]. The intestines and spleen were normal.—*Surgeon E. Bentley, U. S. Vols., Slough Hospital, Alexandria, Va.*

CASE 11.—Private Orvill S. Stockwell, Co. A, 36th N. Y., was admitted Oct. 29, 1862, with dropsy from cardiac disease supervening on acute rheumatism. He complained of pain in the præcordia, palpitations, headache and vertigo: the area of cardiac dulness was increased: he had anasarca, enormous distention of the abdomen and at times a distressing cough. He died suddenly November 9. *Post-mortem* examination: The areolar tissue was everywhere full of liquid and the abdominal cavity contained a gallon and a half of serum. The pericardium was greatly distended with serum in which were flakes of lymph; the surface of the heart was coated with lymph; the ventricular walls hypertrophied; the semilunar valves normal; the mitral and tricuspid thickened. The lungs were congested. The liver and kidneys appeared healthy.—*Hospital, Alexandria, Va.*

CASE 12.—Private Edwin M. Dudley, 5th Mass. Bat'y; age 20; was admitted Oct. 5, 1864, with organic disease of the heart. His comrades reported that he had a short time before suffered from an attack of articular rheumatism. He was anæmic and had anasarca, dyspnœa and a rapid and tumultuous action of the heart unaccompanied by any decided bellows murmur; his pulse was rapid and irregular; tongue covered with a thin gray coat; face turgid and expression anxious; he preferred the sitting posture. The symptoms became aggravated, the heart's action more tumultuous and irregular and the dyspnœa greatly increased: he complained of imperfect vision and roaring sounds in his ears. He died on the 7th. *Post-mortem* examination: There were adhesions and a small quantity of

liquid in the right pleura; both lungs were congested. The pericardium contained two ounces of liquid; the heart was greatly dilated, but there was no marked thickening of its walls; the right side and the great veins were filled with venous blood; the left side contained dark blood with large flakes of lymph entangled among the muscular columns; small, firm, wart-like excrescences were found on the mitral valve and large ones on the aortic valves,—[*Specimen* 472, Med. Sec., Army Medical Museum]: the endocardium was red and injected. The liver presented a fine nutmeg appearance: the gall-bladder was nearly filled with viscid bile: the spleen was healthy, although bound down in the left hypochondrium by recent adhesions. The kidneys, stomach, small and large intestines were congested.—*Act. Ass't Surgeon O. P. Sweet, Carver Hospital, Washington, D. C.*

II.—CHRONIC RHEUMATISM.

Briefly, the statistics of chronic rheumatism are as follows: Among the white troops 109,187 cases were reported, of which 192 or .18 per cent. terminated in death, and 11,779 or 10.8 per cent. in discharge for disability. In every thousand men there occurred annually an average of 49 cases, 4.87 of which were discharged as unfit for service and .44 died, chiefly from affections of the heart: many finished their term of service as cooks and nurses in hospitals, and others were transferred to the Invalid Corps. There remained, however, a considerable number of cases that were apparently returned to duty, but it is doubtful if many of these were really cured. In a majority of the cases the men affected were known to have been elderly, and to have suffered more or less from the disease before their enlistment. On exposure they became temporarily crippled. Under favorable conditions they so far recovered as to be able to resume duty, but on a subsequent exposure they were again taken on the sick report as new cases. The 49 reported annually per thousand of strength do not therefore represent that number of chronic rheumatics, but merely that number of attacks in a smaller number of men predisposed to attack. The discharges caused by this disease constituted 8.62 per cent. of the whole number of discharges reported as occasioned by specified diseases.*

Among the colored troops 13,726 cases were reported during their three years of service. Of these 137 or 1 per cent. resulted in death, and 874 or 6.37 per cent. in discharge. The average annual rate of cases per thousand of strength was 74.8, with 4.26 discharges and 2.14 deaths. Discharges for chronic rheumatism constituted 18.1 per cent. of the whole number of discharges for specified diseases.

The line showing monthly variations in prevalence among the white troops is similar in its outline to that of acute rheumatism, having a higher elevation in the earlier period than later, when recruiting was less actively carried on.—see diagram facing page 828. The fall in the level of the line during the early months of 1863 is even more marked than in that of the acute disease: but subsequently the seasonal variations, which are influenced by the rise and fall of the line of acute rheumatism, are not so well defined in the line of the chronic cases. This is perhaps due rather to the failure of the minimum to fall than of the maximum to rise. It seems probable that the exposures of active service in summer had a greater influence in determining a return of the chronic trouble than in developing an attack of the acute disease. The general similarity in the fluctuations of acute and chronic rheumatism among the colored troops is also noticeable.

Under the term chronic rheumatism were gathered all those tedious cases of painful, stiff and perhaps slightly tumid joints, unaccompanied by the febrile condition, which, if not caused, were certainly aggravated, by exposure to cold and wet. These cases were properly aggregated under the rheumatismal heading. Others also, in which the fibrous tissues of the vascular system, of the periosteum and nervous sheaths became implicated, were no

* See Table XI, *supra*, p. 27, for a statement of the relative prominence of specified diseases in the causation of disability.

doubt properly classified in this manner. But the line of demarcation between a rheumatic inflammation and a chronic non-specific inflammation of these tissues was not clearly defined. Hence all obscure and painful affections of the locomotor apparatus were usually reported as chronic rheumatism. Indeed, in many cases of so-called muscular rheumatism it was impossible to determine whether the muscles or their nervous supply were primarily implicated. There was, therefore, ample room for difference of opinion in forming a diagnosis. That which was regarded by one medical officer as muscular rheumatism affecting the lower extremities, might be considered by another as the result of a meningeal inflammation of the lower part of the spinal cord, due less perhaps to exposure than to injury from over-exertion and the weight of the cartridge-box and other articles of equipment. Thus, Act. Ass't Surgeon KLAPP was struck with the fact that among the large number of rheumatics admitted into the military hospital, corner of Sixth and Master streets, Philadelphia, there was no affection of the joints; the disease was manifested by neuralgic pains. In his opinion the morbid process had its seat in the spinal membranes, and more or less tenderness was readily discovered in his cases in certain parts or along the whole track of the spine, according as the muscular pains were confined to one locality or were general in their distribution.* In this way a connection is established between chronic articular rheumatism on the one hand and spinal meningitis with its paralytic results on the other. In the cases that will be submitted hereafter paralysis from exposure, when seen in its progress to recovery, was occasionally, as in case 11,† regarded as chronic rheumatism.

The well recognized connection between muscular pains and the scorbutic cachexia at one time led many of our medical officers to suspect their rheumatic cases of having a scorbutic origin. After the alarm of scurvy in the Army of the Potomac in the summer of 1862, all obscure cases of pain in the muscles, bones or joints were closely examined with reference to a possible scorbutic taint, and a single case of tumid gums in the regiment or brigade was accepted as an explanation in full. This view was, indeed, officially promulgated in the Eleventh Army Corps by the Medical Director of that command,‡ in a communication which represented the doctrine as pretty clearly established by evidence on file in the office of the Surgeon General of the Army. This evidence has been submitted in the article on scurvy.§ It leaves no doubt of the frequency of pains in the muscles, bones and joints, especially of

* Act. Ass't Surgeon JOSEPH KLAPP—*Medical and Surgical Reporter*, Philadelphia, Vol. VIII, 1862, p. 508—states that a large majority of the cases admitted to the hospital, Sixth and Master streets, Philadelphia, were of a rheumatic nature, and in none was there an affection of the joints. The disease, seated in the spinal membranes, was attended with severe neuralgic pains in various parts of the body, but with no perceptible swelling in any of the affected parts. Why the disease assumed a character so unusual in civil life is regarded as of interest. If due simply to exposure and ordinary fatigue it should have been attended, as in private life, with at least some share of articular affection. That it was not due solely to an enfeebled condition of the system is considered evident from the fact that our typhoid cases did not complain of such pains until they had in some measure recovered their strength. Dr. KLAPP suggests that an explanation of the frequency of the spinal affection in soldiers may be found in the burdens they have to carry and the manner of carrying them, in the long or forced marches and other exhausting services of the field, with cold from exposure night and day to the inclemencies and changes of the weather, while the system thus worn out is supplied with a diet not always suitable for the recovery of its tone. Tenderness was found along the whole spine, or in certain regions whence originated the nerves of the affected parts. He holds that by keeping this fact in mind we may discover the seat of many of those anomalous affections of the chest and abdomen otherwise puzzling and annoying. A very few of the patients complained of pains about the head; a few were troubled with thoracic pains, but more with pains about the abdomen, and these last were attended with excessive sensibility of the surface. Sometimes the rheumatic affection simulated disease of the lungs or heart, but physical exploration readily detected its spinal origin. Functional disturbance of the liver with jaundice was found only in a few instances, but dyspepsia and diarrhœa, from an irritable condition of the stomach and bowels, were present in many of the cases. One of the most troublesome, although infrequent, symptoms was a functional derangement of the kidneys, simulating organic disease so closely that its true origin was determined only by the most careful examination. Neuralgia of the legs with partial paralysis and frequently wasting of the muscles was found nearly in every case. The most efficient treatment consisted of cupping, generally dry, along the spine, followed by painting with tincture of iodine alone or with fifteen grains of veratrum in each fluid ounce; internally, iodide of potassium, tincture of cimicifuga, tincture of stramonium and paregoric were administered separately or in conjunction. Other remedies, as quinine, carbonate of iron, extract of belladonna, ferrocyanuret of iron and quinine, and phosphate of ammonia, had comparatively no effect. Dover's powder at bedtime gave relief for the night; and frictions with turpentine liniment and laudanum over the affected parts were of temporary service. To relieve the nervous affection of the chest antispasmodics were used; and in hepatic derangements five drops of nitro-muriatic acid three times a day always afforded relief. Bismuth, magnesia and morphia were employed to allay irritability of the stomach, and tincture of catechu with paregoric was always used with advantage. When the kidneys were implicated, a combination of fluid extract of buchu with tincture of hyoscyamus and sweet spirit of nitre was given.

† *Infra*, page 000. ‡ See *supra*, page 704. § See the reports of NORRIS, WOODHULL, etc., *supra*, page 689 *et seq.*

the lower extremities, as symptomatic of a scorbutic condition of the system, but fails to establish the proposition that many of the cases regarded and treated as chronic rheumatism were in reality cases of incipient scurvy. On the other hand, the anticipation of a scorbutic invasion was viewed with so much alarm by our medical officers that errors of diagnosis were as likely to have occurred on this side of the question as on the other.

The well known views of Dr. WOODWARD, stamped as they were with a semi-official authority derived from his position in charge of the medical records of the army, gave a strong impetus to this doctrine of an all-pervading scorbutic taint as the source of a large number of the cases of so-called rheumatism. While acknowledging the existence of rheumatic affections in the army, he held that the majority of the cases regarded as such by our medical officers were in reality in no way allied to rheumatism except in the presence of a single symptom—pain. These cases he aggregated in a separate chapter of his work on Camp Diseases under the title of pseudo-rheumatic affections. He divided them into five groups:—1, Scorbutic cases; 2, malarial cases; 3, those due to a conjunction of scurvy and malaria; 4, myalgic cases, and 5, malingerers. The first group he considered the most characteristic of the pseudo-rheumatic affections.

The disease begins with malaise, languor and general indisposition to exertion. By-and-by vague pains make their appearance in various portions of the body. These pains are sometimes acute and cutting, sometimes dull and heavy, but very often do not at first amount to more than a sense of soreness in the parts affected.

They may be located in any part of the body, but their most common seat is in the thighs and legs and in the small of the back. The last is especially the characteristic seat of the disorder and is more uniformly involved than any other portion of the body.

The pain and soreness is at first slight, so that although the patient may occasionally come to the surgeon for treatment he continues to do military duty. Very often indeed he does not apply for treatment at all in this early stage, and when he first comes to sick-call, inquiry shows that he has suffered from more or less pain for several weeks or even longer.

As the disease progresses the pain becomes more severe, and, if it is seated in the back or the lower extremities, the patient becomes quite unfit for duty. Sometimes he is confined to his bed, but most frequently he hobbles about with the help of a stick.

Occasionally he retains a perfectly healthy appearance, a normal appetite, and all the functions are performed with regularity. It is to be feared that very many of such patients are malingerers, as will be indicated more fully hereafter. In the majority of cases, however, more or less well-marked symptoms of constitutional disturbance accompany the gradual development of pain. A peculiar pallid, clay-like appearance of the countenance, a tendency towards emaciation, palpitation of the heart—especially after any exertion—the large, cool, smooth, pale tongue, already several times alluded to, and more or less diarrhœa, occurring sometimes from time to time, sometimes persistently, are among the most constant symptoms. Occasionally the gums are more or less spongy or are hardened and bluish, sometimes they bleed when pressed by the finger; in some cases also more or less induration of the subcutaneous tissue occurs, especially in the neighborhood of the knee-joint, the indurated portion being somewhat discolored, of a yellowish or bluish hue, like that of an old bruise; still more rarely purpura-like blotches of small size may be encountered, especially on the lower extremities; but all these advanced phenomena of the scorbutic condition have been comparatively rare among our troops.

The form of pseudo-rheumatism now under consideration is most common among troops who have been ill supplied with fresh vegetables, and is more or less common in accordance with the degree to which they have been exposed to the conditions heretofore laid down as the ordinary causes of a scorbutic diathesis.

An examination of the joints fails to detect any of the stiffness, enlargement or deformity so common in chronic rheumatism. The only exception are the comparatively rare cases in which the scorbutic state is sufficiently advanced to give rise to those peculiar bruise-like indurations above mentioned as occasionally present. This condition is, however, so characteristic that it is readily recognized,—the peculiar diffuse induration, which pits slightly on pressure, but not so much as in œdema, and the yellowish, bluish and livid discoloration make the diagnosis easy.

There can be no doubt that the cases now under consideration are to be interpreted simply as examples of incipient scurvy. From the neuralgic character of the pain, which is so prominent a symptom, they might in fact be designated as scorbutic neuralgia. Originating under precisely the same circumstances as other forms of scorbutic disease, they will be found to disappear under the use of a liberal antiscorbutic regimen. This view, if correct, is of the highest importance, as it indicates at once a mode of treatment by which thousands of men, too often discharged the service as incurable, may be saved to the army.

In another class of cases, which is perhaps equally common, the constitutional symptoms are entirely different. The complexion is more or less icteroid in hue, and a peculiar anæmic pallor, conjoined with the evidences of hepatic disorder, permits at once the recognition of the condition described in a previous chapter as chronic malarial

poisoning. More or less disorder of the bowels, in the shape of constipation or of slight diarrhœa, is usually present. Tenderness and increased dulness of percussion in the region of the spleen indicate enlargement of that organ. Occasional attacks of intermittent fever are common. In this class of patients the pain does not usually precede the development of the constitutional symptoms; on the contrary, the latter often last for a considerable period of time before the neuralgic phenomena make their appearance. Not unfrequently the pains are decidedly intermittent, pursuing either a quotidian or a tertian type.

This class of cases is most common among troops exposed to decided malarial influences who have, however, escaped the causes of scurvy, or who have not been exposed to them for a sufficient time to develop the symptoms of scorbutic disease.

In still a third class of cases, which up to the present time has been much more numerous than either of the preceding conditions, the two groups of symptoms above described are variably commingled. The troops operating in a malarial region and exposed more or less to the influences which develop the scorbutic tendency, suffer from pathological conditions resulting from both these sets of causes; with the icteroid hue, enlarged spleen and anæmia of chronic malarial conditions, the smooth, large tongue, irritable heart, clay-like countenance and loose bowels of the scorbutic state are conjoined.

A certain number of these cases escape without the rheumatic pains under consideration, but a large number are affected by them.

It appears probable that the great majority of the chronic cases of rheumatic pains occurring in the army belong to one or another of the three categories sketched above.

But there are other cases frequently reported as rheumatism which are more trifling in their nature and generally last but a short time. The patient, after some exposure, such as picket duty in the rain or sleeping in wet clothes or on the damp ground, experiences a slight chilliness, sometimes amounting to a rigor, and followed by feverishness, furred tongue and some dryness of the skin. Accompanying these symptoms is some soreness and stiffness of the muscles of the trunk and limbs, sometimes amounting to actual pain. This condition lasts two or three days and then usually subsides, even when no treatment has been employed. These cases, spoken of familiarly as colds in the limbs, constitute a very simple affection and are not allied to true rheumatism. They probably consist essentially in a state of congestion and irritation in the muscles affected, resulting from the effects of the exposure.

The several diverse states thus briefly sketched constitute the great bulk of the cases of disease reported under the head of rheumatism. There remains to be considered a very large group of cases often reported in the same class, in which the most scientific examination fails to detect any disease whatever. The patients complain as loudly of pain in the back and limbs as in the most decided cases of genuine rheumatism or of malarial and scorbutic neuralgia. They stoop in their gait and limp about by the aid of sticks, but they appear well nourished, have a good appetite, devour their full ration of food and present none of the grave constitutional symptoms described in connection with the cachectic neuralgias we have considered. Nor are any of the symptoms of chronic rheumatism present. There is no deformity, swelling, stiffness or immobility of the joints. Occasionally the patient pretends stiffness of a joint, sometimes of the elbow, more frequently of the knee. An attempt to execute passive motion meets with a resistance which sometimes cleverly imitates the immobility of a rheumatic joint; but if he be put under the influence of an anæsthetic, all rigidity disappears and the limb can be moved freely in every direction. These patients are more apt to attribute their malady to a strain than the genuine cases, and tell frequently a pitiful story. The experienced surgeon will very often detect them by this story alone; they whimper and even sob in an unmanly manner, which in itself alone should produce suspicion. This suspicion is confirmed by finding, on careful examination, that all the constitutional symptoms of rheumatism, scorbutic and malarial disease are absent.

Examples of these various groups were seen by probably most medical officers who served in the field, but on behalf of these gentlemen it is claimed that they recognized the causative influences of the scorbutic and malarial groups and that they reported and treated their cases accordingly. In fact, the cases which they reported as scurvy were precisely those incipient cases of that disease which Dr. WOODWARD has indicated as constituting his first and most characteristic group of the pseudo-rheumatic affections. Cases of aggravated scurvy seldom occurred except in the prisons: mild or incipient cases were a product chiefly of war-camps and active campaigns; but the latter were rarely mistaken for rheumatic disease. Of fifty-eight cases of scurvy that have been submitted only one, case 4, was recorded on the hospital case-book as chronic rheumatism; and in not one of the cases of rheumatism, to be submitted hereafter, is there a suggestion of a scorbutic connection. But the most convincing proof that incipient cases of scurvy were not reported as rheumatic affections may be found in the want of relation between the periods of prevalence of scurvy and rheumatism. If the cases in question contributed so largely to the statistics of rheumatism, as has been assumed by Dr. WOODWARD in the establishment of his first and third groups of the pseudo-rheumatic affections, the influence of a scorbutic prevalence would have been

markedly impressed on the lines of prevalence of rheumatic disease: but nothing of this kind is shown by the statistics. During the early months of the war, when scurvy was practically absent from the ranks of the white regiments, rheumatism, acute and chronic, prevailed to a greater extent than at later dates, when scurvy was evidently present in certain portions of the army. In July and August, 1862, when the scorbutic rate of the army as a whole was raised to 4 monthly per thousand of strength by the outbreak among the troops at Harrison's Landing, the rates of acute and chronic rheumatism experienced no corresponding increase. In January, 1863, when both acute and chronic rheumatism attained their highest rate of prevalence, but few cases of scurvy were reported, although the profession was alive to the possibility of its occurrence. In April, 1866, when scurvy reached its maximum of prevalence, there was no associated rise in the rate of prevalence of rheumatism. So, in July, August and September, 1864, the increased prevalence of scurvy among the western troops corresponded with a seasonal minimum of acute rheumatism, and a similar but less marked seasonal depression in the line of prevalence of the chronic disease. These are the striking points in a comparison of the diagrammatic lines of prevalence of the diseases in question. Closer investigation at intervening points, or a comparison of the lines of prevalence among the colored troops, attests, by a similar want of correspondence, that the cases reported under the term rheumatism had no association with the scorbutic cachexia. In fact, excepting an occasional error in diagnosis, as in case 4 of the records of scurvy, the whole of Dr. WOODWARD's first group, and the scorbutic proportion of his third group of pseudo-rheumatic affections, were the cases of scurvy, not those of rheumatism, reported by our medical officers as having occurred among the troops.

On similar evidence the malarial group of pseudo-rheumatic cases may be shown to have been recognized, reported and treated as due to the influence of the malarial poison.

Congestion or irritation of the muscles or their nervous supply, due to exposure to cold and wet, has already been indicated as forming part of the complex series of cases reported under the title of rheumatism.

Malingerers, who made use of the subjective symptoms of chronic rheumatism to effect their escape from the restraints, discomforts and dangers of military life, or to secure by a subsequent re-enlistment the large bonus offered for recruits or substitutes, were perhaps in most instances affected to some extent with the disease of which they complained. Their malingering consisted of an exaggeration of the actual condition or of an asserted continuance of the disability after its removal by hospital care and treatment. Although the records present few cases of malingering, there was perhaps scarcely a regimental medical officer whose experience did not include the persistent efforts of one or more men to be relieved from the dangers of field service by transfer to general hospital or discharge on certificate of disability. As observed by Dr. WOODWARD, the rheumatic malingerer more frequently attributed his malady to a strain or injury than the genuine sufferer. The following, from the records of the hospital at Quincy, Ill., may be taken as an illustration of these cases:

CASE 13.—Benjamin Sweet, Co. L, 119th Ill.; age 52; was admitted July 27, 1863. He says he was hurt in attempting to mount a mule, and thinks he must have separated the pelvic bones. The fact is he is old and has fulfilled the purpose for which he was enlisted, that of counting one in making up the number of the regiment. I have no doubt his captain would like to get rid of him, as he is not fit for the field. He was kept in hospital pending his transfer to the Invalid Corps, but getting tired of waiting, he deserted, or went home to see his wife and children and was reported as having deserted. October 14: He has returned voluntarily, and, having been handed over to the provost marshal, will, I suppose, be sent to Springfield to cost the Government a few more dollars. He has complained of his back, breast and legs; in fact every part of him has at one time or another been the seat of trouble. He has been treated with cups, blisters, tonics, strychnia and colchicum, full diet and plenty of exercise, but all to no purpose. He is

one of the kind that cannot be cured while in the military service. [The regimental records show that this man was recommended for discharge by Surgeon THOMAS MUNROE on the ground of "strain of the pelvic ligaments and old age."] The discharge was granted Dec. 4, 1863.

Cases of feigned disease frequently occasioned much mental worry to the attending surgeon, who, by virtue of his office, became invested at once with the duties of prosecutor and defender—representing on the one hand the interests of the man, on the other those of the Government. Usually, however, close watching and vigorous treatment enabled him to form an accurate diagnosis. But transfers from hospital to hospital often permitted the malingerer to play his part over again for the study of a new medical superintendence, so that ultimately he accumulated a history of continued disability which in itself became an argument for his discharge on economic grounds.

The clinical history of chronic rheumatism consists of the twenty-one cases, 14 to 34, inclusive, herewith submitted. Thirteen of these recovered so far as to be regarded as fit for active military duty by the medical officers who treated them,—and in one the subsequent discharge of the soldier for a gunshot wound of the right foot tends to corroborate this medical opinion; in ten the evidence of a continued freedom from the rheumatic affection consists of the nonappearance of the names of the men on the hospital registers after the date of their return to duty; in one the soldier was transferred to the Invalid Corps on account of his age; and in one case, 24, the subsequent death of the patient from hepatic disease throws a doubt on the nature of the pain and swelling of the limbs by which his previous attack of so-called rheumatism was characterized. Of the eight remaining cases, one was transferred to the Invalid Corps; six were discharged—in one of which, 30, there was permanent contraction of the thoracic and abdominal muscles, and in three, 31–33, a cardiac complication; in 34 death resulted from heart affection.

CASE 14.—Captain J. L. Wyatt, Co. F, 101st Ill.; age 38; was admitted Sept. 28, 1863, with rheumatic pains of four weeks' duration, following an attack of rheumatic fever. The thoracic viscera were healthy. Tincture of colchicum in doses of fifteen minims was given, but as no benefit was derived acetate of potash in fifteen-grain doses was used three times a day from October 3. After this the patient improved; he rested better at night, and by the 14th was free from pain and able to walk about. He was returned to duty on the 19th. [This officer was mustered out with his company at the close of the war, June 7, 1865.]—*Officers' Hospital, Louisville, Ky.*

CASE 15.—Serg't John W. Hunt, Co. E, 145th N. Y., was admitted March 28, 1863, from Stanton hospital, Washington, D. C. He had been attacked with fever in December, 1862, after which he was sent to Convalescent Camp, Alexandria, Va., where he was taken with rheumatism, which persisted until the time of his admission into this hospital. The right knee-joint and left hip and knee-joints were affected; he had also lumbago. Rochelle salt in drachm doses gave no relief; iodide of potassium was substituted, and by May 14 the patient was decidedly better; his appetite was good and he could walk with comparative comfort. He was returned to duty June 29. [This man's name does not again appear on the sick reports.]—*Ladies' Home Hospital, N. Y.*

CASE 16.—Private Ira A. W. Cochrane, Co. E, 16th N. Y.; age 40; was admitted Aug. 10, 1862, for chronic rheumatism. The pain, which was chiefly seated in the lumbar region, disabled him from active motion; he also complained of more or less pain in the upper and lower limbs. He had no marked disturbance of any organ or function. He was treated with compound tincture of guaiacum and warming plaster to the loins. He was considered convalescent about the beginning of January, 1863, but an attack of acute bronchitis from exposure delayed his return to duty until February 10. [This man's name does not again appear on the sick reports.]—*Satterlee Hospital, Philadelphia, Pa.*

CASE 17.—Private William A. Elderkin, Co. E, 1st Me.; age 22; was admitted Aug. 10, 1862, for chronic rheumatism, chiefly affecting the limbs. He had suffered from diarrhœa during the Peninsular campaign and was much reduced in strength and flesh. The diarrhœa after a time yielded to astringent and tonic treatment, but the rheumatism continued. This was treated by colchicum and alkalies, anodynes at night and careful attention to the state of the skin. The pains in the limbs were unattended by swelling or redness and were most marked in the length of the bones rather than in the joints. On account of the deteriorated condition of the patient's blood, evidenced by pallor of the surface, slow and feeble circulation and general languor, iodide of potassium was prescribed with compound syrup of sarsaparilla and good diet. Under this treatment the pains gradually ceased; his flesh and strength returned with better rest at night. During his convalescence he was troubled with dyspepsia accompanied with much gastrodynia. For this he took charcoal and prepared chalk in doses of five grains each three times a day with a carefully regulated diet. He left the hospital to rejoin his regiment on March 4, 1863. [He was afterwards admitted into

Harewood hospital, Washington, D. C., with a gunshot wound of the right foot, and was discharged from service April 23, 1864.]—*Satterlee Hospital, Philadelphia, Pa.*

Case 18.—Private Martin Perkins, Co. C, 37th N. Y.; age 23; was admitted Dec. 12, 1862. The patient stated that early in September he was taken with rigors followed by rheumatic fever affecting all his joints; he had at the same time a severe attack of dysentery which lasted till the end of November. He now complains of constant pain in the lower part of the back and left hip-joint, and is unable to walk without the aid of a stick. Iodide of potassium in five-grain doses three times a day. December 21: Patient no better. Omit iodide and give Fowler's solution three times a day. February 8: Stop arsenic, which has done no good, and give wine of colchicum three times a day. 11th: Somewhat better. Treatment continued; full diet. 19th: Colchicum stopped; no benefit. Give half an ounce, three times a day, of a solution of two ounces of Rochelle salt in eight ounces of water to which half an ounce of liquor morphia sulphatis has been added. 27th: Improved. April 17: Placed on guard duty. May 30: Returned to duty. [His name does not again appear on the sick reports.]—*Satterlee Hospital, Philadelphia, Pa.*

Case 19.—See case of Corporal Emanuel Davis, Co. K, 137th N. Y., No. 30 of the clinical records of the continued fevers, *supra*, page 261. [His name does not appear on the sick reports after his recovery from this attack.]

Case 20.—Private John O. Sullivan, Co. E, 29th Wis.; age 22; was admitted Sept. 23, 1863, with chronic rheumatism and diarrhœa. He complained of pain in the præcordial region; his skin was clear, eyes bright, tongue clean and appetite good. He suffered in his knees, ankles and back. He was treated with iodide of potassium, turpentine emulsion and milk diet. He improved rapidly and was returned to duty December 2. [This man's name does not again appear on the sick reports.]—*Hospital, Quincy, Ill.*

Case 21.—Private Roswell H. Snook, Co. H, 119th Ill.; age 25; was admitted Oct. 27, 1862, with pain in the chest, left hip and knee, of three or four weeks' duration. Tongue clean; pulse 80; left knee very painful. Two grains of quinine and eight of Dover's powder to be given every four hours. 29th: Pain in right side of chest; pulse 90. Eight grains of iodide of potassium at each meal. 30th: A grain and a half of quinine at each meal. November 4: Continue iodide; omit quinine. December 6: Discharged to join regiment. [Report of Adjutant General of Illinois, Vol. 7, p. 35, shows this man mustered out with his regiment June 15, 1865.]—*Hospital, Quincy, Ill.*

Case 22.—Private Benjamin L. Wierman, Co. B, 77th Ill.; age 21; was admitted Nov. 2, 1864, from hospital at Camp Butler, Ill. He had been attacked with rheumatism in September, 1863, and had done no duty since that time. The lameness is confined to the right knee-joint, which is much swollen. Give iodide of potassium and full diet. December 7: Knee still swollen. Jan. 1, 1865: Improving; able to exercise. March 17: Returned to duty. [This man's name does not again appear on the report of sick.]—*Hospital, Quincy, Ill.*

Case 23.—Henry Stine, Co. G, 110th Ill.; age 49; was admitted June 9, 1863, with chronic rheumatism, affecting the back and lower extremities. His bowels were constipated. He improved under iodide of potassium and a nutritious diet; the bowels became regular and the pain less severe. Nitric acid was afterwards administered and he speedily recovered, but, on account of his age, was transferred to the Invalid Corps November 25.—*Hospital, Quincy, Ill.*

Case 24.—Frederick Staley, Co. M, 5th Ill. Cav.; age 40; was admitted Sept. 25, 1863, having done no duty since November, 1862, when he was taken with rheumatism. On admission the patient was unable to leave his bed; the pain was confined to the lower extremities along the course of the sciatic nerve; there was some swelling of the limbs; his appetite was poor; bowels constipated; tongue furred; pulse quick. He improved slowly under iodide of potassium and a nutritious diet; but subsequently, when nitric acid was administered, his recovery was rapid. He was sent to his regiment December 2. [This man was admitted into McPherson hospital, Vicksburg, Miss., from regimental hospital, Sept. 27, 1864, and died October 29, of portal congestion.]—*Hospital, Quincy, Ill.*

Case 25.—Private Joseph Wiser, Co. B, 2d Colo. Cav., was admitted Jan. 20, 1864, having been unfit for duty for several months on account of rheumatism affecting his knees and ankles and to a less degree his neck and shoulders. He was stout and well-built, yet worthless as a soldier. He was treated chiefly with nitrate of potash until April 15, when cinchona and colchicum were used, with wet cups to the neck and knees and anodynes at night. Citric acid was afterwards employed. On July 15 resort was had to guaiacum. On August 31, when cinchona was again used, the patient was able to do light duty about the wards. He was transferred to hospital at Fort Leavenworth October 12, and was returned to duty on the 28th. [This man's name does not again appear on the hospital registers.]—*Kansas City Hospital, Mo.*

Case 26.—Captain P. F. Hansborough, 11th Ky. Cav.; age 45; was admitted from the field Nov. 1, 1864, having suffered from rheumatism for four months and been unable to attend to duty for five weeks. The left hip and knee-joint were affected. The attack was preceded by acidity of the stomach and indigestion, and accompanied by torpidity of the liver. Compound cathartic pills were followed by thirty grains of nitrate of potash three times a day in half a tumblerful of gruel; Rochelle salt and bicarbonate of soda were afterwards employed to keep the bowels soluble; Dover's powder was given at bedtime. Granville's lotion* was used on the joints. By the 17th he had improved very much, but the rheumatic pains continued to recur at intervals. Leave of absence was granted. [This officer's name does not again appear on the sick report.]—*Officers' Hospital, Louisville, Ky.*

Case 27.—Joseph McMahon, Co. F, 52d Ill.; age 32; was admitted April 27, 1863, with chronic rheumatism. He was pale and anæmic, feeble and unable to walk on account of the swelling of his joints. He was treated with quinine, iron and nutritious diet, and was kept in a good warm atmosphere. He improved slowly, but ultimately was able to walk about well. He was transferred to the 27th Co., 2d Batt., Invalid Corps, November 25.—*Hospital, Quincy, Ill.*

* An irritant consisting of liquor of ammonia, spirit of rosemary and tincture of camphor.

CASE 28.—Private Valentine Switzler, Co. B, 39th N. Y., had rheumatism for several months about the year 1855. From that time till 1862 he had comparatively good health, and served in the field for eighteen consecutive months. About October, 1862, he had a second attack of rheumatism, which became chronic, affecting chiefly the knee and elbow-joints. He was admitted Oct. 24, 1863. There was much thickening of the tissues about the joints, with exquisite pain on motion. Iodide of potassium in five-grain doses was given three times daily, and was gradually increased to fifteen grains. He improved slowly up to Jan. 25, 1864, when he could walk about with the aid of a cane; but after this there was no further improvement. There was no heart disease. He was discharged from service April 9.—*Central Park Hospital, New York City.*

CASE 29.—Corp'l Levi T. Faulkner, Co. G, 124th Ill.; age 28; was admitted July 9, 1864, from Jefferson Barracks, Mo. The patient stated that he had been lame since the winter of 1862–63, and had done no duty since November of the latter year. He had pain and lameness in the lumbar region and lower limbs; headache; increased cardiac impulse; palpitation and dyspnœa; atrophy of glutei muscles on both sides. The iodides of potassium and iron were employed with full diet, but no improvement took place, and on August 14 he was sent to Springfield, Ill., with a view to his discharge.—*Hospital, Quincy, Ill.*

CASE 30.—Private August Lang, Co. E, 1st N. J. Cav.; age 34; coach painter; enlisted Aug. 20, 1861; contracted rheumatism in November, but remained with his regiment; did no duty after January, 1863. April 22: Admitted to Columbian College hospital, Washington. Blisters and cups were applied without relief. May 19: Transferred to this hospital, arriving next day. 21st: Five grains of iodide of potassium three times a day. 22d: Troubled mostly at night. Gave a drachm of cod-liver oil three times a day and applied a liniment of ammonia, laudanum and tincture of aconite. 25th: Applied six wet cups to the right hip. June 5: Stopped iodide of potassium; gave a tablespoonful three times a day of a mixture containing a drachm of the tincture of aconite-root in six ounces of water. 9th: Stopped the aconite. 10th: Three drops of solution of arsenite of potassium after each meal. 18th: Applied six wet cups between the shoulders. 23d: Used ward liniment. 25th: Gave warm bath. 29th: Pain on pressure, shooting towards the heart. Applied a blister one inch square; continued arsenic and liniment. 30th: A tender point on right side of spine opposite tenth dorsal vertebra. July 5: Gave a lotion consisting of one ounce of alcohol, three ounces of water and one grain of corrosive sublimate, to be used three times a day. 15th: Stopped cod-liver oil. 16th: Suspended all treatment except the wash, which was continued until August 30, when it also was disused. September 16: Dover's powder at night. October 21: Fifteen drops of wine of colchicum three times a day. 22d: Four compound cathartic pills. November 21: Continued colchicum. 29th: Stopped colchicum. December 4: Ten grains of blue-mass in two pills at once. 5th: Jaundice. Gave extract of dandelion and aromatic syrup of rhubarb. Jan. 19, 1864: Stopped treatment. March 20: Gave three compound cathartic pills; also a liniment consisting of two ounces each of ammonia and tincture of arnica, one and a half ounces of chloroform and four ounces of compound tincture of soap. April 11: Discharged because of permanent contraction of the anterior abdominal and thoracic muscles following rheumatism.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 31.—Corp'l Jno. F. Slocum, Co. D, 1st R. I. Cav.; age 21; contracted rheumatism in the fall of 1862, and was admitted May 7, 1863, from Judiciary Square hospital, Washington. 9th: Gave Fowler's solution; full diet. 16th: Dover's powder at night. 19th: Pulse 106, easily compressed; impulse of heart jerking and felt in two intercostal spaces; slight tenderness in cardiac region; pain on exertion; unable to lie on left side; first sound deficient in volume and strength; suffered severely from shooting pains in joints, hips and various parts of the body. Gave one-sixtieth of a grain of digitaline twice a day. 29th: Fowler's solution twice a day, digitaline once. June 4: Stopped arsenic; digitaline three times a day. 7th: Sulphate of magnesia. 19th: One-thirtieth of a grain of digitaline three times a day. 24th: Two grains of quinine four times a day. July 2: Two cathartic pills daily. 7th: Stopped cathartic; dysentery. Gave suppositories. 16th: Gave one grain of opium twice a day. August 17: Recovered except swelling of right hand. To have it wrapped in carded cotton and oiled silk. 20th: Rheumatism passed to other joints. Applied iodine, glycerine and water; wrapped the joints in simple bandage and used cold douche morning and night. 21st: Discharged because of chronic rheumatism.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 32.—Corp'l John Mockler, Co. C, 17th N. Y.; age 28; was admitted Dec. 8, 1864, from hospital at Jeffersonville, Ind. The patient stated that he had been taken with rheumatism at Atlanta, Ga., in November. He complains of pain mostly in the knees; he has dyspnœa on exertion and pain in the left side of the chest; pulse 120, feeble; impulse of the heart increased at the apex; sounds normal. Gave tonics and full diet. Jan. 1, 1865: Pulse still rapid; dyspnœa aggravated; countenance livid. Tonics and anti-spasmodics. March 29: No better. Discharged from service.—*Hospital, Quincy, Ill.*

CASE 33.—Private Euel Flanagan, Co. B, 89th Ill.; age 34; was admitted Oct. 24, 1864, from hospital, Madison, Ind., where he had suffered from rheumatism for two months. He had some cardiac trouble; the impulse was increased and there was evidence of pericardial inflammation. Iodide of potassium was employed, but no improvement was manifested. He was discharged March 23, 1865, as the second sound of the heart was indistinct and he suffered from distressing dyspnœa.—*Hospital, Quincy, Ill.*

CASE 34.—Private William N. Sandt, Co. A, 115th N. Y., was admitted Oct. 18, 1864, from Hampton hospital with chronic rheumatism. On December 2 he became affected with diarrhœa which lasted until the end of that month, when he began to improve. On Jan. 18, 1865, from exposure he had a return of rheumatism, diarrhœa and some bronchial cough. Wine of colchicum was given, with diaphoretics, expectorants, astringents and opiates. The diarrhœa persisted notwithstanding all treatment. On the 30th the patient complained of slight pain in the præcordia. On February 1 he had palpitation of the heart, intermittent pulse, 40 per minute, and orthopnœa. Next day

the pulse was quick and soft and there was much pain in the region of the diaphragm; his breathing was labored; death occurred suddenly at 11 P. M.—*Whitehall Hospital, Pa.*

In the cases constituting the *post-mortem* records of chronic rheumatism death was due to the implication of the heart in the three cases 35–37, and to the supervention of choreic movements and pulmonary congestion in case 38.

CASE 35.—Private Michael Collins, Co, M, 16th N. Y. Cav.; admitted July 13, 1864. Diagnosis: Chronic rheumatism. Died August 11. *Post-mortem* examination: The right lung and pleura were inflamed: there was marked pericarditis; two large abscesses were found in the spleen.—*Third Division Hospital, Alexandria, Va.*

CASE 36.—Private George Palmer, Co. K, 27th Colored Troops; admitted Dec. 7, 1864. Died Feb. 10, 1865. He had been troubled with diarrhœa, cough and chronic rheumatism up to February 8, on which date his pulse was 80, respiration normal, tongue clean and appetite good; he had pain in the loins and shoulders, but was able to walk about. On the evening of this day he had a chill with intense cardiac pain and dyspnœa; the heart beat strongly, 150 per minute, and there was dulness with a friction sound and bellows murmur. *Post-mortem* examination: The lower lobe of each lung, the omentum, spleen and kidneys were tuberculous; the mesenteric glands enlarged. There was recent pericarditis with adhesions.—*Act. Ass't Surgeon A. F. Pattee, L'Ouverture Hospital, Alexandria, Va.*

CASE 37.—Private Calder Barnes, Co. C, 8th N. Y. Cav.; age 34; admitted March 25, 1865, with chronic rheumatism and heart disease. He had great dyspnœa and the heart-sounds were obscured by a regurgitant murmur. He died suddenly May 27. *Post-mortem* examination: The pericardium was closely and firmly adherent to the heart, which was very large, weighing thirty ounces; the mitral and semilunar valves were thickened and covered with warty vegetations.—*Jarvis Hospital, Baltimore, Md.*

CASE 38.—Private Altimore Joiner, Co. C, 37th Colored Troops; age 33; was admitted Oct. 2, 1864, with rheumatism. He complained of cough and pain in the chest, which were relieved by treatment, but the rheumatic pains persisted and the patient became weak and nervous. On Feb. 10, 1865, the record states that he seemed to be affected with some nervous disease, manifested by twitchings of the mouth and hands. Colchicum, gentian, valerian, whiskey, quinine and iron were employed. On March 3 some febrile action was set up, the pulse becoming full and the tongue coated; for this citrate of potassa and morphia were prescribed. Next day eight ounces of brandy were given with small doses of sweet spirit of nitre. On the 5th the fever had declined, but the nervous disorder was aggravated, the patient having no command over his voluntary muscles and being unable to articulate distinctly. He died on this day by asphyxia. *Post-mortem* examination: There was some superficial congestion of the brain but no organic lesion. The heart was small and anæmic; its right side contained venous blood. Both lungs were much engorged.—*Summit House Hospital, Philadelphia, Pa.*

The following extracts relating to the causation and treatment of acute and chronic rheumatism are submitted:

Surgeon J. M. RICE, *25th Mass., New Berne, N. C., March* 10, 1863.—Rheumatism affecting the spinal region, hip and legs is of frequent occurrence and obstinate in its character, yielding slowly to treatment.

Surgeon J. FRANKLIN DYER, *19th Mass., Dec.* 31, 1861.—During this time [at Harrison's Landing, Oct. 21 to 23, 1862], for three days and nights our men were exposed to rain with little sleep and no shelter. These hardships served to develop latent disease; several cases of chronic rheumatism and phthisis date their development from that period. A few days subsequently we moved to higher ground, where we had the advantage of purer air, but many suffered from severe colds by reason of the exposed position of the camp and insufficient clothing.

Surgeon AUGUSTUS R. EGBERT, *U. S. Vols., Fort Humboldt, Cal., Nov.* 1, 1862.—The climate aggravates rheumatic and pulmonic diseases. Rain falls nearly all the time from November to May.

Surgeon E. GRISWOLD, *112th Pa., Fort Saratoga, D. C., June* 5, 1862.—The sudden change from the comforts of civil life to the privations and exposure of camp in the middle of a winter so changeable as the last produced its legitimate effects on the health of the men. Rheumatism became prevalent, chronic cases greatly predominating.

Surgeon W. W. BROWN, *7th N. H., Beaufort, S. C., June* 30, 1862.—Most of the twenty-three cases left at Fort Jefferson, Tortugas, Fla., were rheumatism of a subacute character; some of the men were quite feeble. Dysentery was often immediately followed by rheumatic disease. As our meteorological register shows a limited range of temperature we were surprised to see so much disease of a rheumatic character. Many men, hitherto strangers to it, were disabled for several days, and nearly all who had any tendency from previous attacks were severely visited.

Act. Ass't Surgeon THOMAS T. SMILEY, in commenting on the diseases met with at Hilton Head, S. C., in October, 1862, says that cases of rheumatism were not infrequent, but that nearly all were chronic and occurred in persons who had been subject to rheumatic attacks before they entered the service. The disease affected the hands, shoulders, feet, knees and every other part known to be liable to seizure. Many of the patients had done no duty for a year. The ordinary remedies proved of little avail and many of the cases had to be given up as hopeless.*

Surgeon A. H. LANPHIER, *106th Ill., Jackson, Tenn., Dec.* 31, 1862.—Resident physicians tell me they have more rheumatism and intermittent fever than all other diseases together. I suppose that the low swampy surface of the country will account for this fact. It is customary here to give large doses of quinine in acute rheumatism, and the practice is by no means unsuccessful.

* See *Boston Medical and Surgical Journal*, Vol. LXVII (1863), p. 272.

Ass't Surgeon C. S. WOOD, *66th N. Y., Sept.* 30, 1862.—Rheumatism was quite prevalent at Yorktown from cold and exposure to wet. The ordinary anti-rheumatic remedies had very little effect; colchicum and guaiacum were tried in vain. Taking it for granted that this was due to a malarial complication, I used a cathartic, followed by a grain of opium and five of quinia, every four or six hours, with the happiest effect.

Surgeon DAVID MERRITT, *55th Pa., Beaufort, S. C., May* 10, 1863.—Acute rheumatism has assumed a malarial character to a very great degree. Hence, quinine and capsicum are used with much advantage in conjunction with iodide of potassium and acetic extract of colchicum. Chronic rheumatism has been also very prevalent, particularly among men rather advanced in age, who, anxious to enlist, had not acknowledged, and perhaps took much trouble to conceal, their liability to the disease. In this climate, warm during the day and cool and damp at night, it has become very troublesome and assumed a periodic character.

Surgeon M. R. GAGE, *25th Wis., Columbus, Ky., March* 31, 1863.—Rheumatism has been of common occurrence and in many cases of serious character. Lying upon the damp and moist earth, no doubt its chief cause, is nearly certain to re-develop the disease in those who have at any time previously suffered from its attacks. To these cases, if fever be a dominant symptom, we administer at first an active purgative of which calomel is an important constituent; this is followed by opium to allay suffering, and calomel as an alterative. When the mercurial taint is manifested the calomel is omitted, but the opium is continued with small quantities of ipecacuanha, opening the bowels at occasional intervals. When the acute symptoms have disappeared, colchicum is a serviceable addition to the treatment. We give but little attention to topical applications in the acute form, believing them to be of little, in fact, of *no* service.

Surgeon JAS. S. WHITMIRE, *56th Ill., in the field, Miss., Dec.* 31, 1862.—In connection with the usual remedies for this disease, colchicum, tartar emetic, nitrate of potash, opium, etc., I dry cup the spine; and from this treatment my patients not infrequently derive immediate and sensible benefit.

Surgeon ALLEN F. PECK, *1st N. M. Mounted Vols., Fort Stanton, N. M., Dec.* 31, 1862.—Cases of rheumatism were quite common during the months of November and December. They were chiefly of the scorbutic character; in some most of the joints of the body were affected and in others only one or two. I give sulphate of magnesia at once,—half an ounce, with a drachm of magnesia. After the bowels have been well moved I give, three or four times a day, thirty grains of bicarbonate of potash with ten grains of nitrate of potash and ten drops of laudanum. If these fail to allay the pains, I give Dover's powder at bedtime. If the disease is confined to one or two joints great benefit is derived from small blisters, frequently repeated; and when there is much prostration brandy two or three times a day, with plentiful supplies of good nourishment, are required.

Surgeon JNO. I. SAVILLE, *2d Colo. Cav., Fort Union, N. M., Sept.* 1, 1862.—I succeed well in relieving the rheumatism of this country by the use of syrup of buchu, sassafras and iodide of potassium. I persevere in the use of this until all inflammatory action ceases; and finally bring the system up with bitter tonics and iron.

Surgeon WM. R. BLAKESLEE, *115th Pa., near Alexandria, Va., Oct.* 20, 1862.—As regards the rheumatic cases, much good was effected and great relief afforded by the administration of a drachm and a half of iodide of potassium, with two grains of sulphate of morphia, in eight ounces of peppermint-water, in doses of a tablespoonful every four or five hours. In the case of an old man, in whom there was much jactitation and tremulousness, I obtained good effects from twenty or thirty drops of Hoffmann's anodyne three or four times a day. Cotton was wrapped around the painful joints, which were then covered with oiled silk. The bowels were kept open by Epsom or Rochelle salt.

Act. Ass't Surgeon ALFRED MULLER, *Fort Ridgeley, Minn., April* 1, 1862.—In six severe cases of acute articular rheumatism I used gentle frictions of the chlorure of elayl [chloride of ethylene: Dutch liquid] from one-half to one drachm at a time; in each case there was almost instantaneous relief, and in some a perfect cure from one single application. The relief produced was very evident and continuous; much needed sleep was obtained and convalescence established. I never observed any disagreeable consequences after the use of this remedy. Its effect is such as to leave no doubt of its value; the remission of the pain is so constant and often so instantaneous that it cannot be attributed to mere chance.

Notwithstanding the frequency of the rheumatic cachexia, as doubtfully evidenced by the statistics, ophthalmia was so seldom associated with rheumatic manifestations in the joints that the three cases which follow may be regarded as exceptional rather than as illustrating a class of cases of their kind. The sclerotic, however, became frequently involved in tedious cases of catarrhal conjunctivitis.

CASE 39.—Private Isaac S. Carr, Co. B, 152d Pa.; age 24; had acute rheumatism in 1858, since which time he has been subject to rheumatic pains. He enlisted Oct. 20, 1862. In July, 1863, after exposure to wet and cold, he had pain in the head and pain and swelling around the left eye, which was very red. After treatment at the camp hospital the pain and swelling subsided but the redness remained. All these symptoms recurred in an aggravated form in January, 1864; vision of the left eye became impaired. The patient was furloughed, and on his return was treated with some benefit, at Wills hospital, for rheumatic iritis. He was received into this hospital from Camp Cadwallader February 6. At this time his general health appeared good; his left eye was very red; a distinct zone surrounded the cornea, which presented a small opacity, some slight vascularity and several small points of ulceration; the iris was discolored. Photophobia and impairment of vision were associated with these local changes. Gave a tablespoonful, three times a day, of a mixture containing an ounce of Rochelle salt and six drachms of wine of colchicum

in seven and a half ounces of water; sulphate of zinc wash; full diet. 13th: Improving. Gave a teaspoonful, six times a day, of a mixture containing one ounce of oil of turpentine and half an ounce each of sugar and gum acacia in seven ounces of peppermint-water, and applied turpentine around the eye six times a day. 15th: Less redness; vision improved. March 5: Redness subsided; slight impairment of vision. Continued treatment. 11th: Well; returned to duty.—*Turner's Lane Hospital, Philadelphia, Pa.*

Case 40.—Private Allen T. Hammond, Co. M, 2d Colo. Cav., was admitted March 6, 1864, with conjunctivitis. His eyes had been perfectly sound until Nov. 12, 1863, when first one and in a few days the other became inflamed and painful, feeling as if grains of sand were incommoding the ball. He was then at Fort Lyon, Colo., where he was treated with flaxseed and opium poultices for nine weeks. On admission into this hospital a solution of nitrate of silver was applied; but it caused so much pain that the patient refused its further application. Gave iodide of potassium, acetate of potash and muriate of ammonia, and used a zinc lotion occasionally. May 10: Eyelids granular; vision imperfect; iris inflamed. Patient cannot read longer than fifteen minutes at a time; on a dull day he is unable to recognize an acquaintance at fifty paces; objects at a hundred paces appear double. Gave two teaspoonfuls morning and evening of a solution of two grains of corrosive sublimate and twenty grains of iodide of potassium in three ounces of water; applied sulphate of copper to the lids every third day; fly-blister below and behind the ears. 31st: The patient during the past ten days has suffered much from conjunctivitis; photophobia has been distressing, but was allayed by means of a drop of a solution of five grains of morphia in a fluid drachm of glycerine. June 30: Cornea injected. The lids to be everted every third day and painted with a solution of twenty grains of nitrate of silver in one ounce of water. July 31: Discontinued nitrate of silver and substituted six grains of red precipitate ointment in one drachm of simple cerate; to be applied morning and evening. August 7: Diarrhœa for a few days. Gave anodynes and astringents. 14th: Diarrhœa persisting; articular rheumatism manifested in the lumbar region and in right knee. Applied volatile liniment and gave a teaspoonful every fourth hour of a solution of morphia, two grains, in one ounce of cinnamon water. 21st: Easier; some debility. 31st: Rheumatic ophthalmia recurring; flakes of lymph doubtfully present in aqueous humor; iris hazy and sluggish; cornea clouded; vessels much injected, especially those around the upper half of the cornea. Applied equal parts of extract of belladonna and mercurial ointment to forehead and temples and gave half a drachm of wine of colchicum every six hours; three compound cathartic pills every second day; ten grains of Dover's powder at bedtime. Continued morphia in glycerine to the eyes. He was discharged from service September 16, at which date he was suffering from intense photophobia, being unable to keep his eyes open long enough to see anything, even if the condition of the aqueous humor and cornea had permitted him to see.—*Kansas City Hospital, Mo.*

Case 41.—Serg't Turner Locks, Co. F, 118th Ill.; age 31; was admitted Aug. 26, 1863, having been suffering with sore eyes for six weeks. They were red, painful and sensitive to light. The patient's health was otherwise very good. Elixir of calisaya was given and a collyrium of acetate of zinc. September 4: Lids granular but eyes less painful and sensitive. Nitrate of silver solution substituted for the zinc; elixir continued. The silver caused much irritation and was discontinued in favor of sulphate of copper. October 27: After the application of blisters to the temporal and mastoid regions the eyes improved considerably. Nitrate of silver was again tried, but stopped on account of the irritation it caused. He had pain in the hips and legs at night; for this morphia was administered. November 2: The pain in the right hip assumed a rheumatic character and was associated with some fever. Iodide of potassium was given and the elixir omitted. 7th: The silver solution was again tried on account of a purulent discharge from the eyes. Quinine was given along with the iodide. 9th: Severe pain in the temporal region. A collyrium of extract of belladonna and morphia was prescribed. 11th: Severe circumscribed pain with increased inflammation and a muco-purulent discharge from the right eye. The bowels were freely opened by a mercurial purge. 16th: Pulse 90; bowels constipated; a small gray spot on the right cornea; some chemosis and an occasional paroxysm of severe pain. 19th: A gray spot on the left cornea; severe pain extending to the back of the head. Quinine and sulphate of iron, laxatives and low diet were prescribed. 28th: Inflammation and pain lessened; left cornea almost completely clouded with gray exudation. The patient had a severe chill this morning. Cantharidal collodion was applied around the eyes and quinine was given in five-grain doses every four hours; extra diet. December 1: The chills are suppressed, but there is fever, with delirium at night; pulse 90, small; tongue cleaning; some thirst; a slight erysipelatous redness about the nose. Iodine was applied to the face, and ten drops of the tincture of muriate of iron with quinine in two-grain doses every three hours were administered. The patient was kept in a dark room and continued on extra diet. 2d: The erysipelatous swelling has extended to the forehead; bowels open; eyes less congested; left cornea opaque, right clouded at one spot; delirium in the evening. Treatment continued, with morphia, nourishing food and stimulants; valerian and ammonia were also employed. 3d: Mind clear; profuse epistaxis during the night; erysipelatous swelling subsided; tongue brown and dry in the centre; pulse feeble and intermittent. The muriate of iron and quinine, with extra diet, were continued. 16th: He has slowly improved; the circumorbital pain has abated considerably and the opacity is diminished. Jan. 1, 1864: He has continued to improve and is able to walk about; appetite good; bowels regular; the sight of the left eye is very imperfect. Quinine and good diet were continued. April 1: He has been furloughed for twenty days and has continued to improve. The left cornea is almost wholly obscured, the right but slightly. He can discern objects close by, but at a distance can with difficulty distinguish a person. He was discharged from the service May 6, 1864.—*Act. Ass't Surgeon F. K. Bailey, Hospital, Quincy, Ill.*

The inflammatory results of exposure to cold and wet were exceptionally localized in other parts of the body: In 42 there was a recurring periostitis of the tibia, and in 43 and 44 suppuration in the vicinity of the hip-joint.

CASE 42.—Private L. Granniger, Co. H, 137th Pa.; age 22; was admitted Dec. 2, 1862, having already passed three months in the Finley hospital, Washington, D. C., with rheumatism. He was weak and anæmic, and complained of pains which became aggravated in damp cold weather. Five grains of iodide of potassium three times a day, with generous diet and porter. 25th: A well-marked attack of periostitis of the tibia. To rub mercurial ointment over the affected part. Jan. 2, 1863: No iodide of potassium in the surgery; a teaspoonful of Huxham's tincture thrice daily. 15th: Increase of pain with slight fever. Twenty grains of acetate of potash three times a day. 18th: The acetate having affected the bowels is discontinued. 20th: A teaspoonful of cod-liver oil three times a day, and to have, in addition to the regular house-diet, two pints of milk and two eggs daily. 21st: A slight friction sound over the cardiac region, but no increase of fever; the patient too much reduced to admit of depleting measures. No change in the treatment. February 6: Iodide of potassium again prescribed. 7th: Periostitis of the malleolus. To be rubbed with mercurial ointment. 12th: Not quite so well. One-twelfth of a grain of corrosive sublimate to be added to each dose of the iodide. 16th. A severe attack of periostitis of the tibia. Treatment as before. March 14: Somewhat improved in general health, but to-day both legs and ankles are affected with periostitis. 18th: Placed by the discharge board in the Invalid detachment. April 21: Transferred to the guard. May 8: The attacks of periostitis are always slight and do not last more than two or three days; they are characterized by redness and pain upon pressure over the affected bone; very slight roughness is perceived by passing the finger over the tibia. I occasionally see the man, who appears now to have regained his health. He denies all specific taints, and there is no evidence that the affection is of syphilitic origin.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 43.—Private William Payne, Co. H, 9th Ind.; age 42; enlisted February, 1862, previous to which time he had never been sick. He did duty until September, when he was attacked with rheumatism after exposure to cold and wet. The disease manifested itself in the right hip-joint: In October a swelling extended from a little below the right external abdominal ring to the right anterior inferior iliac spine; this was lanced, bringing away about four ounces of pus, while he was at Bowling Green, Ky., about the middle of November; after which about a tablespoonful of matter came away daily. When admitted to this hospital, November 28, he could not walk without a cane; he had pain in the right hip-joint when he rested on that leg. Gave ten grains each of powdered guaiacum and carbonate of ammonia every three hours, and applied a compress. 29th: Much pain during the night. Applied a liniment of two drachms each of oil of cajeput and laudanum, half an ounce of turpentine and one ounce of volatile liniment; also a saturated solution of alum. December 1: Swelling somewhat diminished. Injected the cavity with ten drops of solution of chlorinated soda in one ounce of distilled water. This caused considerable pain; but the injection was repeated with a weaker solution on the following day without discomfort. Wooden compresses were applied on each side of the sinus. 7th: Swelling diminishing; discharge of pus lessened. Discontinued guaiacum and ammonia; continued the injection, alum lotion and compresses. 10th: The injection caused a cold feeling extending nearly to the hip-joint. 13th: The sinus is almost closed towards the ilium, but a hard and painful tumor has developed near the external abdominal ring. 15th: Applied nitrate of silver to the tumor; discontinued the wooden compresses and injections and applied a light cloth compress. 16th: Tumor enlarging. 17th: Inflammation extending from the pubes to the ilium. 22d: Tumor painful, roller-like in shape, with the original opening in the middle; discharge pretty constant; high fever at night. December 29: Died.—*West End Hospital, Cincinnati, Ohio.*

CASE 44.—Private Caswell M. Donica, Co. E, 57th Ill.; age 22; having been exposed for several hours in the rain on April 18, 1862, was attacked with severe pain in his right hip, the whole of the gluteal region becoming swollen, tense and tender; some fever accompanied the local inflammation. He was treated with poultices and iodide of potassium until the middle of June, when an incision was made over the sacro-iliac symphysis and about two quarts of pus evacuated. Treatment by poultices was continued, with wine and generous diet. In September, when he was discharged, the abscess had healed, but the parts remained tender and painful and the patient was unable to bear his weight on the limb; his appetite was good and he was gaining in flesh. An examination of his chest showed a moderate dulness over the lower half of the right side; mucous râles on the left side, with dulness and feeble respiratory murmur below and harsh inspiration with prolonged expiration at the apex.—*Hospital, Quincy, Ill.*

The unsatisfactory results of treatment in chronic rheumatism may be gathered from the cases and extracts that have been submitted, and particularly from the large number of patients discharged as unfit for service after prolonged periods of treatment in various hospitals. Among the internal remedies used were iodide of potassium, colchicum, guaiacum, sarsaparilla, Fowler's solution, quinine and iron with or without nux vomica, cod-liver oil, acetate and nitrate of potash, tartrate of soda and potash, citric acid, nitric acid, etc. Dover's powder at bedtime, or morphia, in conjunction with the basis or principal ingredient of the anti-rheumatic prescription, was frequently used to allay the distress of the patient. In many cases most of these remedies were tried at one time or another without avail. In case 30, a patient who had been submitted to more or less treatment from November, 1861, to May, 1863, was admitted into the Satterlee hospital, Philadelphia, Pa., and during the year that elapsed until his discharge in April, 1864, he was subjected to iodide of potassium, cod-liver oil, tincture of aconite, Fowler's solution, wine of colchicum and other remedies, with vigor-

ous local treatment, but without the production of any permanent benefit. Nevertheless the repute of many of these remedies may be sustained by pointing to individual cases. Recovery took place under the administration of the acetate of potash in case 14; of guaiacum in 16; of Rochelle salt in 18 and 26; of quinine and iron in 27; of iodide of potassium with colchicum and guaiacum in 19, with sarsaparilla in 17, and alone in 15 and 20–24. Iodide of potassium, indeed, appears to have the weight of testimony in its favor; but there is an important *per contra* to this statement: In 18, 29, 30 and 33 it was valueless; and there were but few of the 12,653 white and colored soldiers that were discharged on account of disability from rheumatism who had not been subjected to its influence prior to their discharge. No doubt the admission of these men into hospital was in many instances followed, as in case 28, by a certain amount of improvement to which medical care and comforts certainly contributed, but their recovery was not effected. Local treatment by wet and dry cupping, warm applications, carded cotton and oiled silk, occasional cold douches and counter-irritation by iodine, various stimulating liniments and blisters, was equally uncertain in its results, although often seeming to afford temporary relief.

The experience of Confederate surgeons was of a similarly discouraging character, as shown by the following extract from the records of the Chimborazo hospital:

> A large number of chronic rheumatics in this hospital receive no treatment. Of those treated nearly all are subjected to colchicum, which has very rarely proved beneficial, either because not adapted to the case or because of bad quality; in doses of twenty drops, three times a day, it has seldom purged. Iodide of potassium is given in nearly every case treated, and with very fair success. Remedies indigenous to the South, and cheap, are seldom prescribed, and guaiacum has been used with great reserve for want of alcohol, which the pharmacy has not supplied. Galvanism is neglected.

The febrile condition in cases of acute rheumatism was frequently treated by quinine, especially in malarious localities. Saline purges, as Epsom or Rochelle salt, with opiates to allay pain, were also in frequent use. Often, indeed, Dover's powder formed the basis of the method of treatment. Colchicum was generally employed. The acetate of ammonia or potash, and the nitrate of potash* with sweet spirit of nitre, were likewise frequently prescribed. The swollen joints were wrapped in carded cotton or flaxseed poultices, or kept soaked in alkaline lotions with or without previous cupping. Tincture of iodine was the only local irritant employed during the acute stage. Pain in the præcordial region suggested the use of opiates and cups, followed by blisters in the event of effusion. Generally, on the subsidence of fever, iodide of potassium was prescribed, with cinchona or other tonics and anodyne or rubefacient liniments to the painful or stiffened joints.

IV.—OTHER DISEASES ATTRIBUTED TO EXPOSURE.

I.—CONGESTION AND INFLAMMATION OF THE SPINAL MEMBRANES.

Among the cases of disease due apparently to exposure to cold and wet were many in which the spinal cord or its membranes became affected. Surgeon ALEXANDER B. MOTT, U. S. Vols., in charge of the Army hospital, Lexington Ave., New York City, says in his report for November, 1862:

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* Surgeon P. A. O'CONNELL, 28th Mass. Vols., *Boston Medical and Surgical Journal*, Vol. LXVI, 1862, p. 82, in referring to the use of nitrate of potash says that:—"Persons have been admitted to the hospital with flushed face, hot skin, rapid and full pulse, the feet, ankles and knees swollen and painful, and a few days sufficed to fit them for duty." The two cases, Nos. 1 and 2, submitted in the text from the case-book of Dr. O'CONNELL's regiment, appear to sustain this statement.

A disease much noticed at the present time by that part of the profession connected with the army has been variously named general neuralgia, myalgia, or, from its chief situation, intercostal neuralgia. It occurs mainly in soldiers exposed to the malarial emanations of southern marshes, existing intercurrent with typho-malarial fever, or, in some cases, preceding it or even following its attack; it has also been seen to follow intermittent fevers, but in many cases exists alone. Its prominent characters are the following: Coming on gradually, showing itself first in a portion of the spine, gradually extending around the chest and down the extremities, though in some cases fixed in a particular situation, as in the lower bowels. Hyperæsthesia is a prominent characteristic, the patient fearing the approach of the surgeon lest he be touched carelessly. The body is bent to an angle, and any effort to assume the upright posture is attended with so much pain and distress that the patient will not make the attempt; gait straddling and careful. There has yet been no fatal case at this hospital, so that the local lesion has not been studied. The nutrition remains good and the functions, when not affected by previous illness, are well performed.

Surgeon J. E. SANBORN, 27th Iowa, writing from Jackson, Tenn., March 31, 1863, also refers to this spinal affection:

A singular affection has manifested itself in this regiment, taking the form of a severe spinal irritation and, possibly, spinal meningitis. There is pain in the lumbar region, occasionally sharp but usually dull and aching; at times the feeling is described as a sense of weakness, with inability to stand or sit straight and a difficulty in lying down except in certain positions. There is tenderness on pressure upon the spinal processes or just upon either side of them. The first few cases of this disorder I suspected to be feigned, but the prevalence of the affection and the character of many of the subjects soon indicated that in many cases at least it was a serious reality. Some cases were at first thought to be the result of an affection of the kidneys brought on by lying on the wet ground, an idea suggested by the fact that they were accompanied by dark or very red urine. In other cases it was observed that this affection either followed or accompanied chronic diarrhœa. In the matter of treatment almost every reasonable mode has been employed: Constitutionally, quinine and similar antiperiodics on the miasmatic presumption; then combinations of iodine and other alteratives, with tonics in cases of possible rheumatic diathesis. Locally, stimulating liniments, blisters, cupping, both wet and dry, croton oil, and other forms of external irritation and pustulation, all of which have been almost invariably unsuccessful. A number, having limped about with canes to support their bending spines for some time, have finally been discharged. The temptation is so strong to feign such a disease that special care has to be taken to watch the cases and treat them vigorously.

Sometimes the attack was so sudden that the case, as in 1, 4 and 8 of the following series, was reported as one of paralysis; or as inflammation of the spinal cord or its membranes, if associated at its inception with febrile movement and tenderness over some part of the spine, as in cases 2 and 5; again, the disease was reported as a chronic myelitis when the spinal tenderness, as in case 6, was not associated with a symptomatic pyrexia. Whether the inflammatory action in these cases was modified by a rheumatic diathesis is uncertain; but in its lighter grades, when characterized merely by pain and stiffness, or impairment of muscular power in the limbs, it was generally reported as chronic rheumatism.

According to the records most of the cases of paralysis resulted from exposure in cold and wet weather. In some instances there was a history of injury to the spine, but the proximate or immediate cause in several of these, as in 3 and 10, was evidently the subsequent exposure to the vicissitudes and inclemencies of the weather. The injury, however, may have determined the localization of the inflammatory results of the exposure. The acceptance of this view would give a substantial support to Dr. KLAPP's explanation of the frequency of rheumatic manifestations in the lower part of the spinal canal among soldiers on active service.* Over-exertion and heavy burdens on the loins would predispose by repetition as surely as a more pronounced injury inflicted but once.

The number of white soldiers reported as taken sick with paralysis amounted to 2,837, the deaths to 231 and the discharges to 2,838. The anomaly expressed by these numbers is chiefly due to the fact that among the discharges mentioned were many cases that had made their appearance on the sick-report as inflammations of the spinal cord. Others, reported originally as chronic rheumatism, were discharged on account of an aggravation of the spinal affection manifested by paralysis and muscular tremors, and paralytic sequelæ of such diseases as the continued fevers also contributed to the total of those discharged.

* See note *, page 833, *supra*.

Perfect recovery, implying ability to perform military service, was unusual in these cases of spinal affection. In cases 1 and 2 recovery was complete: Nearly two years after his paralytic seizure the patient in the first case was captured by the enemy, and died afterwards in prison of diarrhœa and starvation; in the second the soldier served with his command until it was mustered out. In 3 the patient, although returned to duty with his regiment, continued more or less disabled, and was in hospital on account of general debility when mustered out at the close of the war. Usually, indeed, the attack was the beginning of a permanent disability from loss of power in the affected limbs and tremors which, in some instances, 8–11, were recorded as paralysis agitans. In the fatal case, 13, the history does not exclude injury as the proximate cause; but in 16, also fatal, there was no traumatism.

In case 12 the patient attributed his paralysis to injury from the wind of a shell which had passed close to his spine. Surgeon D. L. Huntington, U. S. Army, in speaking of alleged injury from *windage*, states* that—"it is now conceded by modern surgeons that without the actual contact of the projectile injuries cannot occur; on the other hand, it is admitted that slight contact from the grazing or brushing of a projectile, or the rolling motion of a cannon-ball over the surface of the body, may, by the weight and momentum, aided by the elasticity of the skin, effect most serious results while little or no external evidence of such contact is left." In this, and similar cases in which there was no external evidence of contact, it is suggested that an explanation of the internal injury may be found in the sudden and violent spasm of the voluntary muscles, which is usually the involuntary result of the near passage of a large and dangerous missile. Muscular action has ruptured internal organs and fractured bones; it is therefore readily conceivable that the spine may have suffered an injury although there was no actual contact with the passing shell.

Case 1.—Private John C. Henning, Co. F, 16th Iowa, being engaged, Aug. 7, 1862, in working in the fortifications, was somewhat suddenly seized with loss of power in the lower extremities. He was assisted to his quarters and rapidly became worse, till on the next day he was completely paralytic in both arms and legs. This condition continued for two days. Treatment consisted simply in the application of a sinapism along the spine, continued a sufficient length of time to destroy the cuticle. On the third day he was much improved and has now so far convalesced as to be able to walk about the camp. The functions of the bladder and bowels were not interfered with, notwithstanding the extent of the paralysis. The paralysed limbs were neither swollen nor affected in the slightest by pain.—*Surgeon Frederick Lloyd, 16th Iowa, near Bolivar, Tenn.* [The reports of the Adjutant-General of Iowa show that Corp'l John C. Henning, Co. F, 16th Iowa, was captured at Atlanta, July 22, 1864, and died at Millen, Ga., Oct. 22, 1864, of chronic diarrhœa and starvation.]

Case 2.—Private Franklin Cooker, Co. A, 138th Pa.; age 20; was struck, Jan. 24, 1864, in the lumbar region and knocked down by the limb of a tree. He was stiff and sore for a few days after this, but continued to do duty until one morning, after a wet night on picket, his legs became paralysed and painful. He also had a sharp pain in the back and the feeling as if a cord were bound tightly around his hips; there was no loss of tactile sensation. He was admitted May 11, having been under treatment in the Emory hospital, Washington, D. C., since February 2. On admission he tried to walk with crutches; there was muscular hyperæsthesia, mostly on the left side; tactile sensibility was impaired on the inside of the thighs, around the knees and on the outside of the feet, and this impairment was greater on the right than on the left side; there was tenderness on pressure over the vertebræ from the first dorsal to the last. Galvanism and tonics were employed. Furloughed August 20; returned September 8. Furloughed November 3; returned on the 24th. Returned to duty on the 26th.—*Turner's Lane Hospital, Philadelphia, Pa.* [This man served with his command until it was mustered out, June 23, 1865.]

Case 3.—Private William White, Co. I, 188th Pa.; age 23; was admitted from Hampton hospital to De Camp hospital, David's Island, N. Y. Harbor, June 10, 1864, whence he was furloughed on the 20th. On August 23 he was received into Haddington hospital, Philadelphia, and on September 2 was transferred to this hospital: Sensation and motion in right leg impaired; inguinal glands slightly enlarged; tonic contraction of right extensor femoris, with jerking of foot and leg on attempting to extend the leg on the thigh. He was first affected in January, while exposed to wet weather, during Kilpatrick's raid. The onset was gradual and was in part attributed to the weight of the cartridge-box in marching, as there had been pain in the lumbar and sacral regions prior to the interference with sensation and motion. Pain was sometimes felt in the left groin, but there was no paralysis on this side. Diagnosis: Meningeal inflammation of the lower part of the cord. Dry cups were applied over the lower part of the

* Page 707 of the Third Part of the Surgical Volume of this work.

spine daily; twenty grains of bromide and five grains of iodide of potassium were given three times daily. He recovered and was returned to duty October 22.—*Turner's Lane Hospital, Philadelphia, Pa.* [Inquiry into the subsequent history of this man shows him treated for neuralgia, Jan. 12, 1865, to January 30, in the field hospital at Point of Rocks, Army of the James. He was returned to duty on the latter date. On May 24 he was received into hospital at Fort Monroe, Va., on account of general debility, and was mustered out July 5. It is of interest to note that he was regarded as a malingerer when at Hampton hospital in May, 1864.]

Case 4.—Private Thomas H. Reid, Co. I, 147th Pa.; age 44; became paralysed while at Camp Crossman, Philadelphia, and was sent to South street hospital March 28, 1864. He was transferred to this hospital May 5 and furloughed July 20; but he became worse and was admitted to Clay hospital, Louisville, Ky., on the 28th. He improved, and on August 8 went to his regiment in front of Atlanta, but as he was unable to do field duty he was placed on the sick-list for a few days. After this he assisted in the hospital, and then acted as hospital steward of Bat'y E, 13th N. Y. On the 31st he was transferred to the Artillery Brigade, 20th Corps, Army of the Cumberland. His health was variable—not so good in bad weather. While going on furlough early in January, 1865, he was much exposed to cold and wet weather on the steamer from Hilton Head. He again became affected with paralysis and, on arriving at Philadelphia, was sent to Broad and Pine streets hospital, thence, January 21, to this hospital: General health not much impaired; total loss of sensation in right foot, partial throughout remainder of right lower extremity; partial loss of motion in same limb; muscular sensibility and irritability not much impaired; left lower extremity but slightly affected; dull pain in the lumbar region. Gave one-sixtieth of a grain of sulphate of atropia three times a day; applied four wet cups to spine; dry cups to be used daily. February 1: Stopped atropia; gave a teaspoonful three times a day of a solution of bromide of potassium in six ounces of syrup and water. 4th: Applied fly-blister six by eight inches. 15th: Sensation improving in left foot. Repeated fly-blister; continued the bromide. May 1: Transferred to Invalid Corps because of partial paralysis of right leg.—*Turner's Lane Hospital, Philadelphia, Pa.*

Case 5.—Private Daniel E. Russell, Co. E, 179th N. Y.; age 24; enlisted in September, 1864; admitted November 30. He stated that about the middle of October, after exposure to excessive fatigue and cold, he was attacked with violent fever and was unconscious for ten or twelve days. On regaining consciousness he had lost the use of his legs. When admitted he was in fair condition excepting the paralysis; there was tenderness on pressure along the entire spine. His condition remained unchanged during December; the innervation of the lower extremities did not improve; the skin was without sensation; there was no pain or uneasiness other than an occasional pricking and numb sensation in the thigh. During January, 1865, he complained of frequent headache and much pain in the groins and testicles, darting up the back; the appetite failed and the muscles of the lower extremities became soft and atrophied. In February the left arm and forearm became numb and stiff, but this afterwards in a measure disappeared. The patient gradually became anæmic. Counter-irritation was applied along the spine, stimulating friction to the limbs and passive motion to the joints; purgatives and alteratives were given, iodide of iron particularly; nux vomica was also used, but cautiously, as it appeared to aggravate the spinal excitement and pain; anodynes and wine were employed. He was discharged from service March 7.—*Third Division Hospital, Alexandria, Va.*

Case 6.—Private David Van Kleeck, Co. M, 17th Pa. Cav.; age 33; was much exposed in the winter of 1862 while scouting and picketing. He felt occasional pains in the lumbar region, shooting down into the legs, and had soreness of the muscles and sensitiveness of the skin. These attacks increased in severity and frequency until July, 1863, when, having been wet by rain while overheated, his lower limbs became paralysed. He was admitted as a case of chronic rheumatism Sept. 11, 1864, from the Mower hospital, Philadelphia, Pa., where he had been under treatment from Oct. 29, 1863. Four months after his arrival at the Mower hospital he was able to walk a short distance with a shuffling gait. In March, 1864, he caught cold and had a relapse which confined him to the ward for three months. On admission to this—Turner's Lane—hospital he had pain in the back, tenderness over the lower lumbar vertebræ and a feeling of constriction around the body at the iliac crests; his legs were numb and weak, but he was able to walk slowly and unsteadily with the aid of a cane; he was unable to stand erect. Electro-magnetic irritability was impaired mostly in the thighs. Applied dry cups to the lumbar region. Furloughed November 3; returned on the 24th. Discharged Feb. 17, 1865, because of partial paralysis.—*Turner's Lane Hospital, Philadelphia, Pa.*

Case 7.—Private Thomas Dowdall, Co. C, 142d N. Y.; age 40; was admitted March 27, 1863, having been suffering for two months from partial paraplegia consequent upon chronic myelitis of the lumbar portion of the spinal cord, the result of exposure to cold and dampness. He had been treated in camp and in the Fairfax Seminary hospital. He could not move about without the aid of crutches. His bowels were obstinately constipated and purgatives only gave temporary relief. Iodide of potassium was fairly tried, but no benefit was derived from its administration. Belladonna plaster was applied to the loins. A furlough of thirty days was granted and extended three times. He was discharged without improvement October 28.—*Central Park Hospital, New York City.*

Case 8.—Private John Molineaux, Co. F, 22d Pa. Cav.; age 50; became paralysed in June, 1864, while sleeping in the rain at night after a hard day's march. For two months after this he was unable to stand; he used his arms, however, the next day to pull himself up; he could feed himself, but could not cut his food. Admitted July 3 to hospital at Frederick, Md.,—transferred August 9 to Camden street hospital, Baltimore, and September 27 to Haddington hospital, Philadelphia. Admitted on the 30th to this hospital: Diminished sensibility of right side of face and of left arm and leg; no wasting or muscular contraction. Furloughed November 3; returned 21st. Discharged because of paralysis agitans Feb. 8, 1865.—*Turner's Lane Hospital, Philadelphia, Pa.*

Case 9.—Corp'l Abraham S. Butler, Co. I, 22d Pa. Cav.; age 24; was wounded in the calf of the left leg Oct. 6, 1863, but this left no subsequent impairment of sensation or motion. While on picket at Bolivar Heights, Va., Jan. 1, 1864, he was attacked with chills and was confined to bed for several days. He was admitted into this hospital

October 13, having during the intervening months been under treatment in several hospitals. He complained of constant dull headache, and was subject to choreic movements of the upper extremities which were aggravated by exposure to cold; he had an aching and numbness throughout the body, and tenderness on pressure over the vertebral spines from the tenth dorsal downward; his appetite was poor and he was affected with constipation and dysuria. He was treated with dry cups and bromide of potassium. He was furloughed in February and discharged April 15, because of paralysis agitans and incipient phthisis.—*Turner's Lane Hospital, Philadelphia, Pa.*

Case 10.—Private Edward W. Gold, Co. F, 90th Pa. Vols.; age 33; enlisted July, 1863. In November following he was hurt by a mule in the small of the back, and passed blood per rectum freely for two days after the injury; but at the end of two weeks he was returned to duty. Soon after this he woke one night chilled and wet by a leak in the roof of his quarters. He was confined to bed for several days with loss of power but not of sensation in his legs. Gradually power returned and he became able to walk with aid. In February, 1864, he had an abscess in his right hand, during the progress of which the arm became swollen, and after the closure of the wound made for the discharge of matter the fingers continued flexed. At this time his legs again became weak, and he was sent to Lincoln hospital, Washington. He was exposed to cold in the cars for eleven hours and to a heavy rain-shower during his conveyance in an ambulance to the hospital. For some time after admission his condition did not improve, but later he began to recover power over his legs. He was transferred to Satterlee hospital, Philadelphia, on May 3,—diagnosis: nervous debility, and on the 31st to Turner's Lane. The records of the latter hospital report the patient on July 9 as having frequent pains in the small of his back and cramps below the knees, chiefly at night; sensation was not materially altered, but the legs and arms were tremulous and powerless, the right arm being in addition considerably atrophied. On August 3 it was stated that the patient was able to walk for the first time since falling into this paralytic condition. On November 21 he was discharged because of paralysis agitans and paraplegia.

Case 11.—Serg't James T. Taylor, Co. H, 99th Pa.; age 36; enlisted July 1, 1861, and did duty until a few days after the battle of Chancellorsville, in May, 1863, when he was found lying in his tent with his lower limbs paralysed. A dark spot, seemingly a contusion, extended from the left knee half way up the thigh. He was treated in regimental hospital, afterwards in the division hospital at Potomac Creek, Va.; from this he was transferred to Fairfax Seminary, Alexandria, Va., where, on his arrival, June 14, his case was regarded as one of chronic rheumatism. He was furloughed July 16, and shortly after his return was transferred, September 23, to Mower hospital, Philadelphia, where he was regarded as suffering from nervous debility. Quinine with extracts of valerian and hyoscyamus was prescribed, and on October 1 he was again furloughed. On his return he was placed on light duty, and on March 1, 1864, was sent to his regiment; but on April 21 he re-appeared as a patient at the Lincoln hospital, Washington,—diagnosis: paralysis agitans. He was transferred to South street hospital, Philadelphia, May 3,—diagnosis: chorea; and on July 25 was discharged because of expiration of service and tremor after paralysis.

Case 12.—Private J. J. Sherman, Co. I, 105th Pa., became affected with chills, nausea and vomiting at the siege of Yorktown, but did duty till after the battle of Fair Oaks, when he was sent to hospital suffering from paralysis of the lower extremities, the right upper extremity becoming shortly afterwards affected. He attributed his paralysis to the wind of a shell which passed near his spine, tearing his clothing but leaving no mark on the skin. He was taken to Long Island College hospital in June, 1862, where he became aphonic, and for a time lost control of the sphincters. He was admitted into this hospital Jan. 23, 1863: Loss of motion and sensation in lower extremities; could move the toes, and after much effort bend and raise the knees; slight power over the movements of the fingers of the right hand but none over those of the other parts of the limb; left upper extremity unaffected; spoke in a fine whisper with little effort; moderate tenderness over the lumbar vertebræ and between the shoulders; pulse feeble but of normal rate; heart-sounds natural; no pulmonic symptoms; appetite poor, but no emaciation; countenance natural; had control of abdominal muscles; no erections or seminal emissions after inception of paralysis; no response to irritation to soles of feet. He had been repeatedly blistered and variously medicated. Gave citrate of iron and quinine; porter; good diet. Frictions were applied to the general surface, and the patient was made to sit up part of the day and to exercise the muscles. He was discharged September 23, on account of paralysis.—*Ladies' Home Hospital, New York City.*

Case 13.—Private John C. Fleming, Co. I, 6th Vt., was admitted Sept. 10, 1863, at 10 A. M. At daylight he had been found lying on the road near a dramshop. Motion and sensation were lost below the level of the umbilicus, but the circulation was good; the abdomen was slightly tense, and there was a slight ridge across the back over the twelfth dorsal vertebræ, but no abrasion, discoloration or other mark of injury; there were no head symptoms. The patient spoke naturally but seemed anxious; he complained of tenderness over the epigastrium, pain in the back and nausea; he stated that he had drunk freely of brandy on the previous day and had been seized with a sudden faintness on emerging from the dramshop, after which he had no recollection of anything until picked up in the morning. He insisted that he had not been drunk. Ipecacuanha was given and the patient vomited freely; the catheter was introduced and five pints of pale urine removed. This gave relief and the sense of feeling returned, but the paralysis of motion continued. A stimulating embrocation was applied to the spine without benefit. Attempts to move the patient occasioned excessive pain. At 9 P. M. there was much tympanites and the pain along the spine persisted. The catheter was used, and an ounce of oil given. He rested fairly during the night, but was no better next morning; the tympanites had increased and become painful. An enema of soap with warm water failed to give relief; three drops of croton-oil were then administered; the catheter brought away high-colored urine. At noon the patient was anxious; had pain in his head and could not bear the weight of the bedclothing on his abdomen; his bowels had not been moved. A strong turpentine stupe was applied to the abdomen, followed shortly by an enema of oil of turpentine, a tablespoonful in a pint of warm water. In a little while very copious stools were passed with

almost instant relief. At 5 P. M. he asked for food for the first time. There was but little pain: the bladder was still paralysed. Forty drops of sweet spirit of nitre were given. On the 12th he was much easier; the urine drawn off was natural in appearance; sensation in the lower extremities was normal, but the motor paralysis continued; there was no pain along the spine except when he was moved. He was transferred to hospital, Burlington, Vt., being carried *en route* on a mattress. He died October 2.—*Regimental Hospital, 6th Vt., Kingston, N. Y.*

CASES 14, 15 and 16.—In making this quarterly report I have to note three cases which will be regarded with unusual interest. One of these died; the other two recovered. All belonged to the 42d Ohio. On Dec. 14, 1861, privates Levi D. Smith, Co. G, age 18; Jas. O. Humphrey, Co. H, age 20, and J. H. Schneider, Co. B, age 17, were admitted into post hospital in the following condition: They all had opisthotonos, affecting the muscles of the back and loins; but those of the neck and face were not affected. The eyes were quite dry and red, the pupils fully dilated and unaffected by light. They took no notice of things around them, seeming to be in a deep sleep. Respiration was increased in frequency but was otherwise natural. The pulse was quick and frequent, from 112 to 128 per minute. The heat of the head and body was about natural; feet cool though not cold. A blister, three by eight inches, was applied to the neck and back, with sinapisms to the feet and legs, and the nurse was instructed to give each a little brandy and water from time to time. From the regimental surgeon and the comrades of the men the following history was received: They were all put on guard at 10 o'clock on the morning of the 12th, and stood the usual time except on the last relief on the morning of the 13th, when they were neglected and allowed to stand from 8 to 12 o'clock. When they were relieved from guard they complained of pain in the bowels and head, for which their surgeon gave to each a small dose of sulphate of magnesia, to be followed, after the bowels were moved, by five grains of Dover's powder and one of calomel. Two powders were given to each man, with the direction that if the first did not quiet them within two hours the second was to be taken. The salt operated freely, after which the powders were taken, each being vomited soon after its administration. In the latter part of the night they slept quite soundly, their comrades said, and in the morning were unconscious. After hearing this account I was at a loss to know what to do. Thinking that the heart's action should be controlled to relieve the head and lungs, I ordered tincture of veratrum viride, two drops every two hours, until the pulse was reduced to 70 or 80 beats per minute. At the same time a strong liniment containing turpentine was applied to the back and bowels. The pulse came down, after the second dose of veratrum, to between 60 and 70 beats per minute, and the respiration became natural and full. Nine hours after they came in one of the patients, Smith, spoke for the first time, complaining that something was biting his neck and that he wanted to make water. He passed urine freely, which, with the exception of slight redness, was of healthy appearance. The second, Humphrey, waked up with a similar request about two hours after the first. The third, Schneider, was examined, but finding no accumulation in the bladder I thought it safe to leave him until later without using the catheter. At midnight he became conscious, making the same request as the other two, and passing water freely. On the morning of the 15th they were all conscious, suffering intense pain all over, sometimes complaining of pain in the back, sometimes in the head and bowels. They were very restless, throwing themselves from side to side on the beds, turning over on their faces and sometimes resting on their hands and knees, but were prevented from resting on their backs by opisthotonic spasms. A profuse secretion from the eyes, nose and mouth commenced on the first night, and was of so acrid a character as to cause redness and vesication of the nose, lips and other parts of the face, and also the hands when wet with it. To relieve their suffering I put them on hyoscyamus, but receiving no benefit from it, I ordered morphine in small doses, frequently repeated, until they rested easy, when the time between the doses was extended. On the evening of the second day quinia, brandy and beef-tea were added to their treatment. This was continued for four days, during which they all apparently improved. Two of the cases were returned to duty three weeks after their admission. The third, Schneider, whose symptoms throughout were of considerable severity, died on December 25. His sufferings resembled those that follow violent and continued muscular action.—*Hospital Records, Camp Chase, Ohio, March* 31, 1862. [This report is unsigned; Surgeon L. C. BROWN, 85th Ohio Vols., appears, from other parts of the record, to have been in charge at the time.]

II.—OPHTHALMIA.

Inflammations of the eye were reported prior to June 30, 1862, under the headings *Ophthalmia* and *Iritis*: subsequent to that date the term *Conjunctivitis* was substituted for the former. During the five and one-sixth years 8,904 cases of ophthalmia and 65,739 of conjunctivitis were reported among the white troops, making a total of 74,643 cases, included among which were probably many cases of scleritis and corneal inflammations, as 1,463 cases—1.96 per cent. of the whole number, or 1 out of every 51 cases—were discharged as unfit for military service: the average annual sick-rate was 33.4 cases per thousand men. These inflammations of the eye were somewhat less frequent among the colored troops, the whole number having amounted to 5,153 cases, or to an average annual rate of 28.1 per thousand. This exceptional infrequency of disease among the colored troops is explained by two considerations: Ophthalmia was not occasioned in a notable degree by the ordinary exposures to cold and wet incident to camp life and active service, but was the

result of special causative conditions existing conspicuously in certain localities. Moreover, these localities were held by a larger proportion of the white than of the black troops. Ophthalmia prevailed to a much greater extent among the troops serving on the Gulf Coast than among those operating against Richmond. During the year ending June 30, 1865, 1,198 cases of conjunctivitis were reported among the 80,982 white troops constituting the Army of the Potomac, while 2,158 cases are said to have occurred among the 45,629 white soldiers serving in the Department of the Gulf. The prevalence in the latter command was generally attributed to sun-glare and sandy particles in the atmosphere of stations on the coast line. Colored troops operated in this department, but the majority of those that contributed to the statistics held the line of the Mississippi river and were protected from the exposures to which ophthalmia was attributed.

During the four years, July 1, 1861, to June 30, 1865, the average annual rate of prevalence of ophthalmia among white troops was, in the Army of the Potomac 17.5 per thousand of strength, in the Department of the Gulf 37.0, in the Department of New Mexico 47.5, and in the Department of the Northwest 85.0—the rate for the whole army having been, as already stated, 33.4 per thousand. From these rates something may be learned of the localities specially affected. The Army of the Potomac suffered lightly; the other commands mentioned had rates considerably higher than the average.

Perhaps the same causes operated in all these localities, but were more intense in some than in others. In Virginia the prominent causes were, in summer, the sun-glare, heat, and especially the clouds of dust that in dry weather enveloped the marching columns; and in winter, draughts in imperfectly constructed huts and foul air in those more effectually chinked, with the acrid smoke of the wood-fire, which, in many huts, was a constant constituent of the atmosphere, and the snow-glare when the soldier was exposed on duty. But the attacks were usually light, and subsided after a short seclusion in hospital from the harmful influences, unless the case was complicated by some constitutional morbid proclivity.

On the Gulf and Southern portion of our Atlantic seaboard the glare of the sun on the white sand of the coral formations, and particularly the dust raised from their surface by the wind, were considered the chief causes of the prevalence of ophthalmia among the troops stationed along these lines. Surgeon S. K. Towle, 30th Mass., writing from Ship Island, Miss., in April, 1862, and alluding to the deep shifting sand of the island, says:

> **The glare of the sun on the white sand does not seem to induce ophthalmia, as I supposed it would. Indeed, I think the most of the injury to the eyes from the sand is mechanical—as, when the wind blows, one's eyes, if exposed, are literally filled with it.***

Ass't Surgeon Cyrus Powers, *75th N. Y., Fort Pickens, Fla., Jan.* 17, 1862.†—**The island—Santa Rosa—is nearly** or quite forty miles long (its western extremity being about forty miles southeast of Mobile) and is entirely composed **of intensely white sand, appearing at a little distance as if covered with salt or snow. When the sun shines the** reflected light from the intensely white surface is almost intolerable, giving rise to a peculiar and obstinate ophthalmia, **resulting, in some instances, in total blindness. Its onset is sudden and is characterized by great intolerance to light and deep-seated pain, with but little external inflammation. Four men of our regiment are already under treatment**, although, in fact, treatment seems to have but little control over the disease. Exclusion of light and cold-water compresses to the eyes and temples, with low diet, seem to be somewhat beneficial. Several soldiers of the New **York Sixth, who came here last May, have been sent home nearly or quite blind.**

Surgeon W. W. Brown, *7th N. H., St. Augustine, Fla., May* 1, 1863.—**The white substance of which these islands** are formed is very disagreeable and injurious to the eyes. The sand forming the surface does not contain a particle **of silex; it is entirely the débris of the coral formation. Several cases of amaurosis, complete and partial, occurred** among our men while at Fort Jefferson; also many cases of ophthalmia more or less severe. As the latitude of the **fort is about 24° north, the sun is nearly vertical at the summer solstice, and the variation not very great during the year. This renders the reflection from so white a substance intensely disagreeable and painful to the eyes.**

* *Boston Medical and Surgical Journal*, Vol. LXVI, 1862, p. 300.

† See *Journal* last cited, page 30.

Surgeon H. HOVET, *46th N. Y., Tybee Island, Ga., Dec.* 31, 1861.—Our prevailing diseases were fevers, diseases of the digestive and respiratory system, rheumatism and phlegmon, also severe cases of ophthalmia, of which the greater part occurred at Hilton Head, where the health of the troops was the worst. The days were hot, the nights wet and foggy, the ground sandy and of such a quality that the dust covered and penetrated everything. To this agency I ascribe principally the cases of bronchitis and ophthalmia.

Ophthalmia was also frequently developed on the sage-brush mesas of the Western Territories, where it was attributed to similar causes.

Ass't Surgeon J. C. C. DOWNING, U. S. A., *Fort Union, N. Mex., March* 31, 1863.—Ophthalmia is occasionally troublesome; the high winds which often prevail are loaded with dust and fine sand, and are highly irritating to the conjunctival mucous membrane. Repeated attacks often result in permanent thickening of the conjunctiva.

Ass't Surgeon CHARLES C. FURLEY, *2d Cal. Cav., Fort Churchill, Nev., Dec.* 31, 1862.—Ophthalmia, generally more or less common, may be considered due to the alkalinity of the water used by the men for their ablutions and to the comminuted particles of dust which are ever flying through the air.

In the northwest the snow-glare takes the place of that from sandy or arid levels. Ass't Surgeon W. H. GARDNER, U. S. A., has given an account of the pernicious effects of reflected light on the eyes as observed by him on these bleak prairie regions.*

The disease is most common in the early part of spring, when the snow is beginning to melt, for then the water formed by the melting snow fills up the irregularities of the snowy surface and makes a more perfect mirror. The grade of the disease accords with the amount of the exposure and the length of time the irritation is kept up, and may occur as an ephemeral conjunctivitis, subsiding in a few hours after the removal of the cause; or as a violent panophthalmitis, destroying the eye at once or leaving a condition which secondarily does so. A troop of Minnesota cavalry marched in the spring of 1866 from Fort Abercrombie, Dak., to Fort Snelling, to be mustered out of service. When their destination was reached there were not ten men in the troop—which was full—who were not more or less snow-blind. In most of the cases the affection was a mild conjunctivitis; but in several there was ulceration of the cornea and in others panophthalmitis, which doubtless permanently impaired the eyesight. Whether mild or severe, the disease was always exceedingly painful and always prone to cause the destruction of the eye. The chemosed conjunctiva interferes with the nutrition of the cornea and tends to its ulceration. This may heal in time, leaving an opaque spot to mark its site, or prolapse of the iris may occur through the perforated cornea. If the irritation of the retina be of long continuance all the tissues of the eye may become involved at once, causing loss of sight. Dr. GARDNER points out that the *lives* of men travelling on the plains in the winter time depend on the organ of vision being intact. The records of the posts in the northwest show some lives lost every winter by men becoming snow-blind, losing their way and perishing in the snow. He advises prevention by the use of goggles, as practised by the Indians, and suggests a hard-rubber eye-cover with a small oval opening in the axis of vision.

The persistence of ophthalmia in individual cases occasionally depended on a rheumatic or syphilitic taint. Its prevalence or persistence in a command was sometimes ascribed to influences affecting the constitution. These were generally malarial. Surgeon JOHN W. TRADER, 1st Mo. Cav., cured his worst cases in a short time after resorting to quinine.† Indeed, this remedy was frequently tried when local treatment proved inefficient. Medical Inspector F. H. HAMILTON attributed the eye inflammations that prevailed in two Ohio regiments to the existence of the scorbutic taint.

Surgeon A. W. MCCLURE, *4th Iowa Cav., near Helena, Ark., Oct.* 1, 1862.—We have had a large number of cases of ophthalmia, many of which have been troublesome to treat in camp. All, however, have terminated favorably except one case, in which there is left a considerable corneal opacity. Our treatment has been mainly quinine, opium, calomel, and the local application of an infusion of opium with acetate of lead or sulphate of zinc.

Medical Inspector F. H. HAMILTON, *U. S. A., Nashville, Tenn., June* 1, 1863.—There was but little sickness among the men of the 171st and 83d Ohio at Dover, near Fort Donelson, and no well defined case of scurvy; but there were about sixty cases of ophthalmia. This disease proved very obstinate and continued to spread notwithstanding the isolation of the cases and the adoption of other prophylactic means. I ascribed it to a want of vegetable food.

The following cases are submitted from the records:

CASE 1.—*Conjunctivitis.*—Private Robert Constance, Co. H, 2d Colo. Cav., was admitted Aug. 8, 1864, with acute conjunctivitis. He had taken four compound cathartic pills and applied mild red precipitate ointment without benefit. Wet cups were used on each temple at once, and repeated in the evening, with warm-water dressings to the eyes. An active cathartic was given. The soldier was returned to duty on the 28th.—*Kansas City Hospital, Mo.*

CASE 2.—*Conjunctivitis with superficial ulceration of the cornea.*—Private Jacob Ecker, Co. A, 47th Pa.; age 40;

* *American Journal of the Medical Sciences*, Vol. LXI, 1871, p. 334.

† He gave three grains of sulphate of quinine and one-fourth of a grain of sulphate of morphia, or one grain of opium, every three hours. Local treatment was restricted to the use of a collyrium of chloride of sodium or acetate of lead.—*St. Louis Med. and Surg. Jour.*, Vol. III, 1866, p. 120.

was admitted to ward L of this hospital Nov. 24, 1863. He had been for some months affected with conjunctivitis. There was slight pain in the eye and a feeling of pressure; at times, also, there was a pricking and burning sensation and a roughness as if sand was under the upper lid; there was likewise a feeling of stiffness owing to heaviness of the lids. Each sclerotic was covered with an irregular light-scarlet vascular network which was freely movable; the semilunar membrane was loose and much swollen; the conjunctival and Meibomian secretions much increased. The general health of the patient was good. An eye-wash of sixteen grains of lapis divinus,* thirty drops of laudanum, four drops of solution of acetate of lead and four ounces of distilled water was applied. 27th: The follicular secretion is gray and filamentous. 28th: The circumference of the cornea is dim. 29th: Epiphora and some photophobia. 30th: The follicular secretion hardens into scabs during sleep and excoriates the edges of the lids. For the eye-wash was substituted an ointment of four grains of alcoholized lapis divinus, fifteen drops of wine of opium, one drachm of lard and half a drachm of camphor—a piece the size of two pinheads was put into each eye morning and evening. December 1: Some dimness of sight, and chromopsia in consequence of slimy deposits forming thin layers on the cornea. 2d: The patient becomes worse every evening; this is supposed to be owing to exposure to artificial light. He becomes worse also after hearty meals. 3d: Some small superficial abrasions on each cornea. 4th: The left cornea shows a facet, the result of a relaxation, and a softening eliminating process in the corneal epithelium. 6th: The patient is improving rapidly. The cornea became clear and the discharge ceased by the 13th. He was returned to duty on the 22d.—*Satterlee Hospital, Philadelphia, Pa.*

Case 3.—*Conjunctivitis with ulceration of the cornea, profuse discharge and photophobia.*—Private William Plant, Co. C, 47th Pa.; age 37; while on duty with his regiment at Key West, Fla., in March, 1863, was attacked with inflammation of the left eye. This subsided partially after two days; but four days later the right eye became affected. The disease persisting, the patient was furloughed August 9. On his return, November 20, he was sent to hospital at Harrisburg, Pa.; thence to York, Pa., December 10, and thence to this hospital March 2, 1864: Much debilitated; catarrhal ophthalmia; ulceration of cornea; excessive purulent discharge; photophobia. Atropine drops: a diluted ointment of red oxide of mercury to the lids; a solution of borax as a collyrium; a teaspoonful every two hours of a solution of one drachm of muriate of ammonia in two ounces each of water and syrup. He improved slowly; the discharge and photophobia gradually diminished. He was transferred to Harrisburg, September 7, for muster out on the expiration of his term of service.—*Satterlee Hospital, Philadelphia, Pa.*

Case 4.—*Conjunctivitis with opacity of the cornea; unsuccessful operation for artificial pupil.*—Private Charles Hendricks, Co. B, 16th Mich.; age 44; caught a severe cold in March, 1864, while on duty with his regiment at Grant Station, Va. He was admitted from Lincoln hospital, Washington, D. C., April 12, with both corneæ ulcerated, excessive purulent discharge and intense photophobia. Borax wash and atropine drops were used, with cod-liver oil internally. July 1: Conjunctivitis much diminished. 15th: Right cornea filled with lymph; left similarly affected except at its margin. August 1: Inflammation nearly subsided; corneæ somewhat clearer; patient can see motion of hand between him and the window, but cannot count the fingers. December 1: An operation for an artificial pupil was successfully performed on the upper and outer aspect of the left eye; the new pupil was perfectly clear, but the vitreous humor and choroid were so deranged that the patient was unable to count the fingers. All treatment was discontinued Feb. 1, 1865, and on March 2 the soldier received his discharge papers on account of total loss of sight from catarrhal ophthalmia.—*Satterlee Hospital, Philadelphia, Pa.*

Case 5.—*Ulceration of the cornea; perforation; albugo.*—Private Thomas Burgess, Co. K, 183d Pa.; age 18: was admitted Sept. 27, 1864, from Summit House, Philadelphia, where he had been under treatment for a gunshot wound of the great toe. His right eye was inflamed and the cornea ulcerated. A fly-blister was applied behind the ear, a saline purge was given, atropine solution dropped into the eye and borax and laudanum used as an eye-wash: a green shade was worn and a screen placed around the patient's bed; foot-bath of salt and vinegar; extra diet. On October 1 the cornea became perforated, but after this improvement was rapid. Cod-liver oil and porter were used. In January, 1864, the eye appeared well but for the albugo; it was, however, sensitive and irritable. All treatment was stopped on April 6, and the soldier was placed on fatigue duty. He was discharged May 16, under General Orders, A. G. O., dated May 3, 1865.—*Satterlee Hospital, Philadelphia, Pa.*

Case 6.—*Conjunctivitis with subsequent gonorrhœal infection, ending in loss of sight.*—Private Harrison Sovocool, Co. F, 109th N. Y.; age 21; was admitted May 5, 1864, from Campbell hospital, Washington, D. C., with an inflammation of the eyelids. A collyrium of alum was used three times a day, and an ointment of oxide of mercury applied to the edges of the lids at bedtime. He improved and was furloughed June 2. He returned on the 24th with gonorrhœa, and the eyes, especially the left, considerably inflamed. A purgative of Epsom salt was given, eight leeches were applied to the temple, a green shade was used over the eyes and a screen around the patient's bed; foot-baths; low diet. Two nurses were specially detailed to sponge the eyes with warm water and alum solution and to ensure cleanliness. The discharge continued profuse; the corneal surfaces became clouded and eroded. On July 5 nitrate of silver solution was dropped into the eyes every three hours; calomel was given. By the 10th there was much improvement, the gonorrhœa meanwhile having been cured. A camphorated solution of sulphate of copper was used as an eye-wash; tartar emetic ointment was applied to the nape of the neck. On the 15th there was a severe relapse; the anterior chambers became filled with purulent matter, the corneæ infiltrated, the irides discolored and the discharge from the eyes almost unmanageable. A dozen European leeches were applied around the orbits, and all local treatment was stopped except the instillation of atropine and frictions to the forehead with an ointment of the white precipitate of mercury. Blisters were applied behind the ears on the 20th, but there was not much improvement until the 27th. He was able to walk about on August 5, when he was taking quinine and iron and using borax washes

* Sulphate of copper, alum and nitrate of potash, heated to watery fusion with camphor, and subsequently congealed.

and diluted citrine ointment. He was discharged November 29 because of nearly total blindness.—*Satterlee Hospital, Philadelphia, Pa.*

Case 7.—*Conjunctivitis with perforation of the cornea and prolapse of the iris.*—Private William Trumboyer, Co. G, 112th Pa.; age 19; became affected in February, 1864, with pain, swelling, loss of vision and purulent discharge from the right eye. He was admitted April 11 to Turner's Lane, Philadelphia: General health good; right eye much swollen; profuse watery and purulent discharge; prominent chemosis; cornea slightly opaque; pain; loss of vision. Scarified conjunctiva after clearing away the discharges; applied nitrate of silver to the eyes; fly-blister to the temple; gave four compound cathartic pills. 18th: Less chemosis. Applied nitrate of silver in solution twice a day. 20th: Slight ulceration of cornea; chemosis increased. Scarified conjunctiva. 21st: Ulceration and opacity increased; swelling and discharge subsiding. Gave porter and sulphate of quinia; repeated fly-blister. 25th: Chemosis relieved and discharge much abated. 26th: Transferred to this hospital. The cornea was ulcerated, the membrane of Descemet ruptured, the iris prolapsed, and there was a constant oozing of the aqueous humor; the patient complained of severe pain in the affected side of the head. Atropine was used; the prolapsus was touched every second day with lapis mitigatus and the eye cleaned occasionally with a borax wash; full diet was prescribed. May 6: Much better. Applied an ointment of white oxide of mercury to the lids; gave two grains each of sulphate of iron and quinine three times a day. 9th: Prolapsed iris inflamed. 20th: Stopped previous treatment but continued quinine and iron. June 1: Prolapsus much reduced in size. 9th: Corneal opening closed by plastic lymph. 13th: On light duty in ward. July 8: General health good. Feb. 6, 1865: Discharged from service because of total loss of vision of right eye and partial loss of left.—*Satterlee Hospital, Philadelphia, Pa.*

Case 8.—*Chronic conjunctivitis.*—Private Francis M. Slagle, Co. H, 2d Ill. Art'y, was admitted June 9, 1863, from St. Louis, Mo. He stated that he had been unable to do duty on account of his eyes since September, 1862. The principal symptoms were congestion and photophobia. Solution of nitrate of silver was used, with quinine, iron, cod-liver oil and full diet. As his condition did not improve he was discharged Feb. 3, 1864.—*Hospital, Quincy, Ill.*

Case 9.—*Chronic conjunctivitis.*—Private Cyrus Wright, Co. E, 83d Ill.; age 42; was attacked with ophthalmia at Fort Donelson, Tenn., in May, 1863, and has done no duty since then. On admission, September 18, his eyes were painful and the lids granular, but his general health was good. Alteratives and tonics were employed, and a nutritious diet with various local applications, but without benefit. He was discharged Feb. 25, 1864.—*Hospital, Quincy, Ill.*

Case 10.—*Chronic conjunctivitis.*—Private Anthony McGowan, Co. F, 12th V. R. Corps; admitted Aug. 23, 1864, with conjunctivitis of more than a year's duration. The conjunctival vessels were greatly enlarged, the left cornea opaque and much thickened and vision nearly destroyed; the right eye similarly though not so badly affected; both very sensitive to light and constantly filled with tears and mucus. Applied weak solutions of nitrate of silver, cold water, morphine, belladonna. The last allayed the pain somewhat, but only for a time. Cupping and blistering produced temporary benefit. Constipation required the frequent use of cathartics. Discharged from service September 27.—*Third Division Hospital, Alexandria, Va.*

Case 11.—*Chronic conjunctivitis.*—Capt. Horace Scott, 3d Ky. Cav.; age 26; was admitted from Officers' hospital, Nashville, Nov. 22, 1864, having had conjunctivitis for fifteen months, although doing duty except during the last eleven days. The lids were granular, their margins thickened and the ocular conjunctiva much inflamed. Improvement followed the use of iodine around the orbit and an eye-wash of chloride of sodium. He was returned to duty Jan. 17, 1865.—*Officers' Hospital, Louisville, Ky.*

III.—SUNSTROKE.

Sunstroke is charged by the Monthly Reports with having occasioned 6,617 cases of sickness among the white troops during the five and one-sixth years; this is equal to an average annual rate of 3 per thousand of strength. Four per cent. of the cases were fatal, the deaths having numbered 261. Among the colored troops, 583 cases with 58 deaths were reported. The average annual rate was, as among the white troops, 3 per thousand; but 10 per cent. of the cases ended fatally. Had there been similar exposures on the part of the white and colored troops the statistics would have indicated an equal susceptibility to the causes of sunstroke, but the numerical records give no information concerning the conditions associated with their facts. There appears to have been no recorded instance of the same march made by white and colored commands under the same dangerous conditions *quoad* sunstroke. Hence the inferences from the statistics are not precise. But the evidence establishes the liability of the colored man to suffer from the causes of sunstroke, and his greater tendency to death when prostrated by this as by most other serious maladies.

The causes of sunstroke operated chiefly during the months of May, June, July and August. These months were credited with 92 per cent. of the whole number of cases, the

proportion of each in the order named having been, respectively, 17.2, 21.4, 31.4 and 22.0 per cent. of the total. But these results depended less upon the temperature of the months than upon other circumstances. The temperature of September, during the years of the war, was considerably higher than that of May and nearly as high as that of June, yet its proportion of cases of sunstroke was small. The temperature of August was somewhat higher than that of July, but its proportion of cases was much smaller.*

Some of our armies suffered more from sunstroke than others. The Army of the Potomac was specially subject: In June, 1863, although constituting only 18.2 per cent. of the strength of the commands that rendered the reports, it furnished 58 per cent. of the cases: in May, 1864, when its ranks contained 18.0 per cent. of the strength of our armies, it furnished 54 per cent. of the cases: in June of the same year, with 16.0 per cent. of the strength, it yielded 38 per cent. of the cases, and in August, with only 9.9 per cent. of the strength, it gave a little over one-third, 33.4 per cent. of the cases. In contrast with this the troops operating in the Department of the Cumberland and Tennessee had these percentages reversed: In June, 1863, they furnished only 17.5 per cent. of the cases while constituting 43 per cent. of the military strength; in May, 1864, they reported 14.9 per cent. of the cases from 33.3 per cent. of the strength, and in August 11.6 from 39.1 per cent.

Sunstroke seldom visited our camps; it seized on its victims while on the march or engaged in laborious field work. Occasionally nine-tenths of the monthly aggregate of cases that occurred in a command were the result of one day's long or forced march. Fatigue was as much an element in the causation of these cases as exposure to the sun. In fact, the majority of the cases reported as sunstroke were the result of heat, over-exertion and an insufficient water-supply. They were a combination of exhaustion with its syncopic tendency, and of an abnormal quality of the blood, manifesting itself by a tendency to stasis, particularly in the lungs or brain. Clinically this was shown by the syncopic character of the attack and the non-suppression of the heat-reducing function of the skin, as manifested by the moisture which bedewed its surface. Recovery in these cases was speedy and complete when the conditions were favorable. The removal of the belts and burdens of the soldier, rest in the recumbent position, protection from the heat and stimulants and water as required, generally sufficed to re-establish his natural powers.

Nevertheless, in most of these cases of exhaustion there existed to some extent a superheating of the blood which rendered them proportionately dangerous. In hot weather the extra heat developed within the system by the toilsome efforts of a hurried march requires to be dissipated to preserve the normal temperature of the body. Harm will ensue if any cause disturb the equilibrium between the production and dissipation of the animal heat. Nature preserves the normal, when the tendency is to an increase, by an increased activity of cutaneous and pulmonary exhalation. Any interference with these cooling processes induces a superheating of the system, which, on reaching a certain degree, becomes mani-

* The statements in the text may be verified by referring to the following mean of temperature observations taken at 3 p. m. during the months and years stated, calculated from the annual volumes of the *Astronomical and Meteorological Observations of the Naval Observatory*, Washington, D. C.:

	[illegible]	May.	June.	July.	August.	Sept.
[illegible]	62.63	70.96	82.57	83.83	83.64	[illegible]
[illegible]	56.67	71.01	75.31	79.95	84.01	[illegible]
[illegible]	54.92	74.11	77.35	80.97	87.64	[illegible]
1864	57.28	75.58	80.54	87.62	85.93	[illegible]
1865	63.73	71.93	82.69	82.96	82.40	[illegible]
Mean	59.05	72.72	79.69	83.07	84.72	[illegible]

fested by urgent symptoms, as a thermic fever or sunstroke. Free play for the lungs and a light body-covering are necessary to the perfect operation of the heat-dissipating processes. Unfortunately the load carried by the soldier during the marches of the civil war not only interfered with pulmonary expansion, but so covered the surface of his body as to prevent its participation in the process of evaporation. His blanket, rolled into a long cylinder, was slung from one shoulder to the opposite hip; his canteen and haversack were similarly suspended by straps from the opposite shoulder, while a waist-belt kept the cartridge-box in position on his loins and the bayonet-scabbard by his side. Not a cooling evaporation, but a profuse loss of water in bulk from the system was the result of exercise under this heavy accoutrement, even though the air might be greedy of moisture. While perspiring profusely on a hot march the laboring foot soldier instinctively bared his breast to the atmosphere and exposed his arms to increase the small extent of evaporating surface. Many medical observers have noted the prevalence of sunstroke in a warm moist atmosphere, which interferes with evaporation from the surface and permits a loss of water from the system without a commensurate dissipation of heat. But even in a dry atmosphere the accoutrements of our troops prevented evaporation by keeping their body-covering in close contact with the skin. Again, the equilibrium between the production and dissipation of heat may be destroyed by a want of water in the system. When the water-supply at the command of the soldier was adequate, the superheating of the blood was so delayed that before it reached a dangerous point a temporary halt for rest, or perhaps the close of the day's march, enabled the system of a threatened subject to recover its normal condition and energies; but in the absence of a constant supply to replace that lost by excessive perspiration the skin speedily became dry. Promptly on the cessation of the cooling influence of evaporation from the surface the temperature of the body rose, and when the point was reached at which normal action ceased, the individual became sunstruck. The following extract from a paper by the writer describes the onset in a case of this kind:*

> The man who is to become the subject of a *coup de soleil*, most likely a raw Irish or German recruit, at first perspires very freely, as indeed do his veteran comrades, while toiling along under the weight of arms, knapsack, blanket and rations. The back of his head feels painfully hot, notwithstanding he may have draped it with a silk handkerchief, reversed his cap or filled its crown with leaves as an infallible protection against the scorching rays. His heart beats violently and his mind is unpleasantly cognizant of its action. He breathes rapidly, open-mouthed, for there is a slight feeling of weight in his breast, which the hot air he inhales, rendered hotter still by the dense clouds of dust with which it is laden, does not seem to have body enough to uplift. Thirst torments him also, while a crowd of lesser evils contribute to the sum of his discomfort. His eyes smart from the influx of the streams of perspiration, which neither the eyebrows nor the greased margins of the eyelids suffice to turn aside; while the optic nervous masses and the brain as a whole ache with the glare of the sun's reflection. He is very miserable, so much so that his mind is filled with nothing but impressions of his own morbid sensations.
>
> These symptoms grow rapidly more distressing. He halts for a moment, and, notwithstanding the remonstrances of his comrades, takes a long draught of the warm water his canteen contains. He feels the better for it and pushes on with renewed vigor, but by and by relapses into his former state.
>
> Your old soldier, when in this condition, drops out of the column, throws his gun and knapsack on the ground and stretches himself at full length in the shade of some tree, where he lies alternately fanning himself and sipping his stock of water. By the time he has finished his canteen he is quite recovered and, as he has no desire to be challenged by the Division Provost Guard, he immediately buckles to the road, rejoining his command most likely at its next resting place. But your raw material does not attempt this, feeling as he does from home if separated from his regiment, and alone in the world when beyond the limits of his brigade. He staggers onward, a vague feeling of some impending calamity oppressing his mind. His heart becomes lessened in power, it flutters rather than beats. The perspiration disappears from his skin, but his thirst increases; he makes frequent but futile efforts to spit away the viscid phlegm that sticks to his lips. The aching in his head becomes pain, the oppression in his chest agony. A tremor seizes his limbs, a feeling of sinking takes possession of his heart and his mind swims into unconsciousness as he falls—sunstruck.
>
> He is insensible. At first, perhaps, he may be able to articulate an indistinct answer to inquiries concerning

* *On Sunstroke as it occurred in the Army of the Potomac.—Amer. Jour. of the Med. Sciences*, XLIX, 1865, p. 543.

his name or regiment if asked in a loud, sharp tone, but this does not last long; he becomes totally unconscious in a very short time. The pupils may be dilated or contracted. His pulse is quick, compressible and small withal; it even intermits occasionally. His breathing is hurried, short, shallow and interrupted now and again by a long-drawn sigh. His skin is hot and dry and his lips livid. He clutches nervously (and this is a measure as well of his insensibility as of his præcordial distress) at his chest with a force oftentimes sufficient, if the surface be exposed, to lacerate the skin. If no one be present to have recourse, either knowingly or unwittingly, to the means calculated to obviate the abnormal condition and promote a speedy return to consciousness and ease the man will assuredly die, unless, indeed, nature should interfere, as she sometimes does, and by the bursting of a thunderstorm effect a cure. The power of deglutition becomes lost as his insensibility deepens. His pulse flickers faintly until, with a sigh, broken perhaps by the death-rattle in his throat, he expires.

But very frequently to these symptoms is superadded one which gives the disease to the onlooker a very fearful aspect. I refer to the occurrence of tetanic convulsions. The intermissions last for two or three minutes or longer, the paroxysms from ten to thirty seconds. As the fit comes on the breathing becomes more rapid and shallow, the limbs writhe and the nervous twitchings of the fingers, as they tear at the præcordia, are very marked. Violent muscular contractions speedily ensue, stretching the body out perfectly straight, or, more commonly, with the head thrown back and the abdomen raised from the more powerful action of the extensor muscles. This condition continues but a few seconds in all its intensity; the spasm then relaxes and seems about to disappear, when, after one or two hesitating twitches, the muscles again start into rigid prominence. This may be repeated several times before the fit comes to a conclusion. While the body is thus bent in rigid spasm the breathing is suspended and the lividity of the lips increases. The termination of the fit is marked by a long sighing expiration, which is less noticeable the nearer the case approaches its fatal end. Death, when it does occur in these cases, usually takes place during the continuance of a convulsive seizure.

The symptoms of the attack appear to depend on loss of water from the blood beyond the limit consistent with functional activities, and on the increased heat consequent on the suppression of evaporation. This indicates, as measures of prevention, free supplies of water and rest to lessen the production of heat and to afford opportunity to relieve the body from its impediments to cooling evaporation. Cold affusion or immersion in water fulfills the indications for treatment.* The first case in which water was used by the writer as the remedial agent was one of many that occurred, Sept. 12, 1863, near Rappahannock station, Va.

I was riding forward to overtake my command, from which I had been separated for an hour or two by some duty, and when I was about half a mile from the tail of the column I found a man in the sun, by the roadside, in convulsions, with a small circle of men belonging to the provost guard around him. He was comatose; his skin was hot and dry; his lips livid; his left pupil dilated somewhat, and his pulse, from its smallness, softness and rapidity, could not be counted. The convulsions were frequent and so violent that I expected that each succeeding paroxysm would terminate life. He had been in this condition for about ten minutes—the fits, according to the statements of the men around, having during that time been steadily increasing in frequency, intensity and duration. A medical officer had seen him immediately after he had been struck down. He could not be said to have treated him, having simply attempted to pour whiskey into his stomach, failing in which he had galloped off to order an ambulance to the spot, leaving instructions that cold cloths should be kept to the patient's head. A man had gone in search of water but had not returned.

I had the patient carried to a house situated about a hundred yards from the road. I laid him down in its shade, and having obtained water placed a few drops in his mouth; but no attempt was made to swallow, and some

*Douching with cold water has been frequently employed by British medical officers in India and the East. J. R. Taylor, Deputy Inspector of Hospitals, gives a gratifying account of his success,—*Lancet*, II, 1858, p. 226: "During the active operations at Martaban and Rangoon, in April, 1852, numerous cases of the acute effects of high and continued tropical temperature came under my care. In every instance the soldier was immediately stripped of all but his trousers, and bheesties then commenced pouring a stream of water, first on the patient's head, then over his throat, chest and epigastrium, and subsequently along the spine. This cold affusion was continued till decided signs of restoration showed themselves. In these cases, accompanied with sickness of the stomach, effervescing draughts, sometimes with compound spirit of sulphuric ether, were found very grateful and reviving, and, in anticipation of this, a large supply of prepared effervescing powders had been included in the light surgical equipment for the field. The cases of insensibility, sometimes lasting from one to three hours, and in some instances attended with one or more epileptic fits or convulsions, were apparently very threatening and strongly suggestive of the necessity for more active treatment; but former experience of the little or very dubious advantage, if not positive mischief, from loss of blood in such cases, together with the fact of the circumstances under which these cases occurred, having been calculated to produce a condition of impoverishment of blood and of exhaustion, were considerations which haply withheld me from all treatment but stripping and cold affusion in the shade. This simple treatment was successful, not one case terminating fatally. The other medical officers on the ground who followed this plan of treatment expressed their gratification at the result." W. C. McLean, of the Army Medical School, Netley, England, gives the following instructions in his article on *Sunstroke*, in *Reynold's System of Medicine*, Vol. II, London, 1868, p. 153: "At the earliest possible moment let the sufferer be carried to the nearest shade, stripped and assiduously douched with cold water over head, neck and chest. If this be effectually and quickly done, the powerful impression on the cutaneous nerves will soon re-establish respiration, at first by gasps and catches, soon in a more regular and tranquil manner. It will also reduce the heat of the skin. It may require to be done again and again; in hospital it may be necessary to envelope the patient in a wet sheet and to ply the fan or punkah over him vigorously until the skin is reduced to a more natural temperature." In the United States, Austin Flint has used this method of treatment with advantage at Bellevue hospital, New York City: see his *Treatise on the Principles and Practice of Medicine*, Philadelphia, 1884, p. 689. Loomis also gives it his approval: "In most cases the *cold-water* treatment is the best. The patient should be taken to the nearest pump, stream or water-tank and immersed for a considerable time, or a stream of cold water should be poured over the head, neck and back. Between the baths dry cups may be applied, and during the baths stimulants may be given if the pulse demands them."—*Practical Medicine*, New York, 1884, p. 1055.

trickling into the larynx, a convulsion more severe than any hitherto affecting him was induced. Thereupon I matted his hair well, wetted and poured it freely over his body, thoroughly saturating the woolen shirt he wore. * * * Presently I thought his spasms recurred less frequently and diminished in intensity; his pulse certainly altered for the better, and his breathing seemed to improve, notwithstanding that his hand tore at his chest with greater violence. As I continued sprinkling water about, a few drops fell upon his lips: his tongue instantly protruded itself and gathered them up. I dropped some intentionally upon them with a like result. He was improving. At the end of the next quarter of an hour, which was a slight one, I raised his head and he drank greedily, uplifting his eyelids as I poured more back upon his pillow, but no gleam of intelligence was yet apparent in his look. In ten minutes more, having drank several times during that interval, and objected by a motion of his head when I held a cup containing a little to his lips, he was conscious. Very much exhausted he was, it is true, but his pulse and breathing were regular, and his sensibility and consciousness had returned, and although occasionally his fingers would twitch as if the old paroxysm of intense convulsion were about to seize him, such movements were not now followed by the general spasm. To prevent any evil effects that might arise from the continued application of the water to his body I directed that the clothing to be removed, the surface rubbed dry and a clean shirt, which his knapsack furnished, to be put on him. His canteen was then filled with water and his blanket wrapped around him before he was transferred to the ambulance.

But sunstruck cases did not always have so favorable an issue under this plan of treatment: for, if during the unconsciousness and convulsions of the primary attack the pathological conditions for some injury of the brain, apoplectic coma, with speedy death or a prolonged illness, was the consequence. Headache, nausea, vomiting, faintness, quickly followed by unconsciousness and convulsions, characterized these cases: but until the development of the comatose state there was always a hope of prompt recovery. When coma supervened treatment consisted of cold to the head, cups and active purgation. General bleeding was seldom admissible, and perhaps fortunately so, as British military experience does not warrant its use.* There is usually so much associated exhaustion in the cases of sunstroke, although when seemingly in the main apoplectic, that the patient is liable to die from syncope during the operation. Happily, however, the comatose state was developed only in a few fatal cases. The experience of civil life gives a fifty per cent. rate of fatality in sunstroke; but this high rate depends upon individual peculiarities: The cases occur chiefly in those who have reached that stage of life when the conditions favorable to the supervention of apoplexy and paralysis are fully matured, while our soldiers were young men, with all their tissues sound and free from the degenerations of advancing years.

Nor was the recovery of consciousness always followed by immediate convalescence. In some cases more or less febrile action was associated with local inflammatory processes of the brain, spinal cord, lungs or other organs. Untoward sequelæ were, however, of more frequent occurrence when the incidence of the morbific influences was mainly in the brain.

The following cases have been collected from the records:

Case 1.—Private William H. Ashwill, Co. G, 8th Ind.; age 22; was admitted July 25, 1863. He had been struck on the head, April 1, by a piece of timber. The wound soon healed and he appeared to have recovered, but on May 17, while marching in the sun at the battle of Magnolia Hills, he fell, fainting, and with severe headache. Some hours afterward he was picked up and carried to the field hospital. He was returned to duty November 9.—*Lawson Hospital, St. Louis, Mo.* [His name does not again appear on the registers of sick; he was mustered out June 14, 1865.]

Case 2.—Private Daniel D. Dunn, Co. E, 6th N. Y. Heavy Art'y; age 30; became giddy and unconscious May 7, 1864, during the operations in the Wilderness, Va. When seized he was lying in the intrenchments under fire, under a hot sun at noon. (The troops had just fallen back; they were heated and the earthworks were damp.) Before his seizure he felt exhausted and sore all over. His unconsciousness lasted five days. He had no feeling in his legs, nor could he move them. Sensation returned about the middle of June, while he was at the Mansion House hospital, Alexandria, Va.; the power of motion returned later in the month. On the 27th he was transferred to the Pine-st. hospital, Philadelphia: Diagnosis—paralysis of the lower limbs. On July 18 he was transferred to this hospital. Spinal tenderness extended from the first lumbar vertebra to the third dorsal. Furloughed September 1; returned on the 23d. Furloughed November 4; returned on the 26th. Returned to duty March 3, 1865.—*Turner's Lane Hospital, Philadelphia, Pa.* [This man's name does not again appear on the registers.]

Case 3.—Sergt John Kiely, 5th Pa. Cav.; age 23; was admitted Feb. 2, 1863. He had been much fatigued and exhausted, Sept. 17, 1862, at the battle of Antietam; a few days afterward, while on duty, he became insensible and

* [illegible]

fell from his horse. He was sent to Mount Vernon hospital, where he remained a month, when he was returned to his regiment. After a few days, being unfit for duty, he was sent to a New York hospital, where he remained six weeks, and was again forwarded to his regiment; but his former symptoms returning while *en route*, he was sent to this hospital. Diagnosis—Sunstroke: Some emaciation; nervous excitability; dizziness on exertion; skin pale, cool and moist; perspires occasionally at night and readily on exertion; lips bloodless; slight cough with weakened respiratory murmur; tongue clean and moist; appetite capricious; constipation; urine normal; sleeps badly. His condition improved under the use of purgatives and compound tincture of cinchona. On the 9th iodide of potassium was prescribed in infusion of quassia. On the 16th, while taking this mixture, he had convulsions at night, and on the 19th dizziness and impairment of vision. Iodide of zinc in two-grain doses, with one-third of a grain of extract of belladonna, was given three times a day. On the 24th he had a convulsion which lasted for a few minutes; there was unusual rigidity; the hands were clinched and eyes shut, but there was no distortion or stertor. On March 4 the zinc was omitted. He was returned to duty on the 23d.—*Satterlee Hospital, Philadelphia, Pa.* [This man finished his term of service without further recorded sickness, and was mustered out Aug. 24, 1864.]

Case 4.—Corp'l James A. Finn, Co. G, 28th Mass.; age 18; had intermittent fever in April, 1862, at Charleston, S. C. About June 1, 1863, after exposure to wet, sleeping in wet clothes, and fatigue, he had a chill and fever, followed by headache and unconsciousness on exposure to the sun; these symptoms, with extreme weakness and wakefulness, continued for five days, during which his pulse was feeble and slow. He was admitted to Mount Pleasant hospital, Washington, on the 14th, and on the 19th was transferred to this hospital. He had lost eighteen pounds in weight since his illness began; pulse 120; heart-sounds unusually clear and sharp. Gave fifteen drops of tincture of digitalis three times a day in mild chamomile tea. An eruption of scattered and slightly elevated papules appeared on the surface of the body on the 23d; he had headache, pain in the back and loins, hot and dry skin and frequent pulse—128. Gave neutral mixture and sweet spirit of nitre. The eruption faded and the febrile action subsided next day; skin cool; pulse 60. Reduced digitalis to ten drops. This remedy was continued in varying doses until July 20, during which time the pulse varied from 110 to 132 when the patient was standing and from 58 to 96 when recumbent. Citrate of iron and quinine was used until August 5, when the recurrence of a chill, followed by fever, led to the substitution of sulphate of quinine in two- and afterwards four-grain doses three times daily; but as this did not control the aguish paroxysms, Fowler's solution, in doses of five drops, was given on September 2. During the three weeks which followed he had two chills. On October 2 he was sitting up, but he slept badly and had some fever, headache and copious perspirations without chills; appetite deficient; countenance dejected; pulse 134 when erect, small and quick; bowels regular; urination frequent and copious; no enlargement of spleen. Improvement was very gradual. Quinine and protocarbonate of iron were prescribed on November 21, and on December 4 all medicine was discontinued and the patient placed on full instead of milk and extra diet. He was returned to duty Jan. 21, 1864.—*Satterlee Hospital, Philadelphia, Pa.* [This man was killed May 5, 1864, in the Wilderness, Va.]

Case 5.—Lieut. A. M. Goltry, 34th Iowa; age 33; fell exhausted at 3 P. M., July 13, 1864, a fiercely hot day for a fatiguing march. After an hour or two he so far recovered as to be able to get into camp, suffering, however, from a violent headache, which did not leave him during the remainder of the summer. The lower and back part of the head was chiefly affected; he suffered also with chills and fever for several weeks. He received leave of absence in September, and while at home improved rapidly, gaining twenty-five pounds of body-weight in thirty days. After August 24 he had partial paralysis. He had been on duty at Port Hudson in the Red River expedition, and afterward at Morganza, and subjected therefore to the malarial influences of the Louisiana swamps. He had taken quinine and iron for nearly three months. From camp he was sent, October 8, to St. James' hospital, New Orleans, whence he was transferred on the 18th to this hospital. He grew rapidly worse after admission, becoming unable to sit up for any length of time or to feed or dress himself. The sartorius, quadriceps extensor and the muscles of the legs and feet were paralysed; the upper extremities were partially affected, the deltoid and coraco-brachialis of each side being specially involved; there was also a loss of power over the muscles of the larynx, by which his speech was affected, and over those of the pharynx, causing difficult deglutition. The extremities, especially the lower ones, were cold, mottled, and so destitute of sensation that, as he stated, he could not tell where his legs were lying; a general numbness with prickling sensations affected them. On attempting to sit up he had uneasy feelings along the cervical vertebræ with flexion of the neck and head; pressure on the first dorsal vertebra made him flinch; he had also weakness and insensibility in the lumbar region; pulse 75; digestion good. Gave one grain of the alcoholic extract of nux vomica every four hours; sponged the surface of the body with dilute tincture of cayenne; applied a 2- by 6-inch blister to the nape of the neck. Diet,—boiled milk, beef-tea, gruel. 31st: Increase of numbness and paralysis of the extremities; secretion from pharynx and adjacent mucous membranes at night abundant, disturbing rest: dysphagia lessened: pulse 84; skin moist: some dyspnœa: no evacuation of bowels for thirty-six hours. Gave blue-pill and Seidlitz powder. November 1: Better; restless at night; mucous secretion free but somewhat diminished; dysphagia lessened; can sit up better and is more hopeful; pulse 96, a little corded; dyspnœa; pain in small of back; appetite fair; skin in good condition. Friction and sponging with tepid water; nux vomica continued. 2d: Rested well; extremities warm; can move about better; skin moist; pulse 84; tongue furred; persisting pain in the back; dyspnœa lessened. 3d: Rested well; extremities warm; skin moist; pulse 82; tongue clean; appetite fair; a little tormina; continued dyspnœa; some involuntary motion of fingers and toes; can shut the fingers with difficulty, but cannot straighten them. Gave nux vomica every five hours, alternating with one drachm of fluid extract of valerian; continued sponging. 5th: Rested well, but has a dull pain in right forearm and hand; motion improving; pulse 84; skin moist. 6th: Not so well; pulse 96 and weaker; did not rest well; tongue a little furred. 7th: Pulse 90; rested better; tongue clean; secretions of mouth and fauces free. 8th: Pulse 90; some trembling sensations in extremities and other parts: motion improving: no dysphagia: a little restless during the night: pain in back part of head.

Omitted nux vomica. 9th: Pulse 68; no trembling sensation. 10th: Rested well, but had some colicky pain and epigastric oppression at night; pulse 90; tongue furred. Resumed nux vomica. During the 11th and 12th the symptoms continued favorable and the treatment was continued. 13th: Received leave of absence. 27th: Discharged for disability.—*Natchez Hospital, Miss.*

CASE 6.—Private David Michener, Co. G, 127th Ill.; age 38; was admitted July 9, 1864. He stated that he had been sunstruck in battle at Resaca, Ga., May 21, and had remained unconscious four days. He was debilitated; eyes languid; lips tremulous; tongue coated; appetite poor. As no improvement was apparent after continued treatment by iron, quinine and a liberal diet, he was discharged October 6, 1864.—*Hospital, Quincy, Ill.*

CASE 7.—Private Nicholas C. Drake, Co. K, 124th N. Y., was sunstruck in September, 1862, while crossing the long bridge from Washington to Virginia, and a few days afterwards was attacked with pneumonia. He was admitted November 13, complaining chiefly of headache and wakefulness. Applied cold water to the head and a blister, 4 by 4 inches, to the neck; gave a grain of calomel three times a day. A larger fly-blister, 5 by 8 inches, was applied to the neck on the 25th, about which time also a mixture of tolu, squill and morphia was given. He was reported as somewhat better on the 29th, when small doses of iodide of potassium were prescribed; but on December 5 the persistence of headache was noted and there was tenderness along the spine. On the 11th the patient was able to be up, but the headache continued and there was pain in the chest. A blister, 3 by 10 inches, was applied to the back; but as he became restless at night and complained of increased pain in the head, a mixture of acetate and nitrate of potash with veratrum viride was prescribed on the 15th. He was discharged Jan. 29, 1863, on account of general debility.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 8.—Private Thomas Clearwater, Co. E, 124th N. Y., was sunstruck in September, 1862, while on the march, and was treated in hospital in Washington until admitted to this hospital, November 13. He complained of headache affecting the forehead and vertex; bowels regular; appetite impaired; tongue coated; pulse, while asleep 84, while awake 108; tonsils swollen and very red. Cold was applied to the head, tincture of iron administered and a solution of nitrate of silver used on the inflamed tonsils. In a few days the throat affection was subdued, but the headache continued. On December 5 the patient was able to be up but felt dizzy. A seton was placed in the neck on the 26th. He was discharged April 21, 1863, on account of sunstroke and valvular disease.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 9.—Private Patrick Denver, Co. K, 97th N. Y.; age 54; was sunstruck Aug. 23, 1864. Facial paralysis followed, with impairment of sight and hearing on the right side, and a few days later he became unable to pick up anything of weight with his right hand, but sensation was not affected. He was treated in the hospital of the Third Division, Fifth Army Corps, in Douglas hospital, Washington, and in Satterlee hospital, Philadelphia, whence, on October 13, he was transferred to this hospital. On admission his condition was as already stated. Electro-magnetic irritability and sensibility were impaired in the right arm and shoulder and lost in the facial muscles except those of mastication; no loss of taste on the right side of the tongue; no arching of the velum palati. Diagnosis: Probable effusion into the fourth ventricle. Gave a teaspoonful three times a day of a solution of one grain of strychnia in one drachm of diluted nitric acid and two ounces and a half of water. He was discharged Jan. 21, 1865, on account of the paralysis.—*Turner's Lane Hospital, Philadelphia, Pa.*

CASE 10.—Private David Plunkett, Co. E, 52d Pa.; age 18; fell, sunstruck, on review at Hilton Head, S. C., May 26, 1864. During the night he had several convulsions, each lasting about twenty minutes. Eight days afterward the right arm and leg became paralysed and numb. On Jan. 1, 1865, he was sent to De Camp hospital, David's Island, N. Y. Harbor, and on March 14 was transferred to this hospital: General health good; right side paralysed and atrophied. Galvanism was applied daily. On May 10 he was transferred to the McClellan hospital, Philadelphia [whence he was discharged June 30, because of hemiplegia].—*Turner's Lane Hospital, Philadelphia, Pa.*

CASE 11.—Private Peter Joyce, Co. H, 77th Ill.; age 23; was admitted Nov. 21, 1862. He had been sunstruck in July and under treatment at Covington, Ky., for five weeks; two weeks after his return to duty he was seized with rigors, which necessitated his readmittance into hospital, where he had fever with wild delirium and intense headache. The fever subsided, but the pain recurred daily about 5 P. M., although gradually decreasing in intensity; the bowels were regular. On admission to this hospital he was weak and much emaciated; he had numbness in some of his members and was subject to vertigo when he attempted to walk; tongue clean; eyes clear; appetite good and bowels regular. On the 24th he was scarcely able to walk; periodic headache continued to affect him. Quinine in two-grain doses was ordered; but next day it was reported that he could not retain the medicine. He had diarrhœa, and although his appetite was good he sometimes vomited after eating; pulse soft and small; tongue clean; headache recurring. The bowels were unmoved on the 26th and continued torpid during the 27th and 28th, the tongue meanwhile becoming furred and the headache acute upon movement, and accompanied with vertigo, instead of dull and heavy as it had been heretofore. Two compound cathartic pills were given, which were followed by two stools. Iodide of iron was given on the 29th, but, the relaxation of the bowels continuing, on December 1 the iron was omitted and chalk and opium administered. The diarrhœa persisted, the stools on the 4th being mucous and bloody and accompanied with some tenesmus, but the headache had meanwhile ceased. Pills of acetate of lead and opium were given, with sinapisms to the abdomen. By the 6th fever had been added to the symptoms; the stools were more frequent and the tenesmus aggravated and accompained with abdominal pain. Opiate enemata were employed with warm fomentations to the abdomen; but these measures failing to procure relief, and strangury having occurred, pills of lead, blue mass, ipecacuanha and opium were given, and seven wet cups were applied to the tract of the colon, with subsequent warm fomentations. The blood drawn was dark and thick and did not exceed a tablespoonful in quantity. On the 7th he had one mucous and bloody stool every hour, fever and much abdominal tenderness. On the 8th there was tympanites but less tenderness; nausea was developed, with vomiting of gelatinous matter dark

lead-blue in color. On the 9th, the symptoms being unchanged except by the increasing exhaustion of the patient, lead and opium injections were used, with flaxseed poultices to the abdomen, all other medication being discontinued. On the 10th the bloody stools continued; the abdomen was very tender; there was fever with delirium and periodic headache, and pain in the urethra during urination; pulse 100 and full. One-third of a grain of powdered ipecacuanha was ordered to be taken every three hours, with enemata of starch and laudanum after painful stools. During the following night six stools were passed, some of which were feculent; the fever continued but the delirium ceased. On the 11th, during the day there were eight stools, three of which contained much blood and mucus; the fever and painful urination continued. Five grains each of mercury with chalk and Dover's powder were given every three hours with one-sixth of a grain of powdered ipecacuanha. On the 12th the stools were neither so frequent nor so bloody and the urination was free. The patient rested well during the following night, and next day the abdomen was but slightly tender; the appetite was improved and the bowels moved but twice, the stools being thin and feculent. A slight aggravation of the symptoms occurred on the 14th and 15th, the strangury returning, but without abdominal tenderness and without blood in the stools, which were greenish and mucous. Bicarbonate of soda was added to small doses of ipecacuanha and Dover's powder and given every three hours. The record to recovery is as follows: 16th: Eight stools at night, green and mucous; much emaciated; less fever; some epistaxis. Gave chicken soup. 17th: Nine stools at night; pulse feeble and thready; abdomen sore; tympanites over ascending and descending colon, dulness over transverse colon; pain during urination. Gave of opium one grain, ipecacuanha one-fifth grain, bicarbonate of soda two grains, every three hours. 18th: Resting better; drowsiness; stools less frequent; fever at night. 19th: Five stools; micturition free; fever at night; periodic headache; abdominal tenderness; appetite better; pulse 85 and feeble; slept much. 20th: Three stools; epistaxis. Applied sinapisms to abdomen, followed by warm fomentations. 21st: Five stools, more feculent. 22d: Three stools. 23d: Five stools. 24th: Improving and gaining strength. Feb. 2, 1863, returned to duty.—*West End Hospital, Philadelphia, Pa.*

Post-mortem observations are exceedingly meagre.

Case 1.—Private Martin Schirm, Co. G, 14th N. Y. Heavy Art'y; age 33; admitted June 15, 1864, with sunstroke. Died 22d: *Post-mortem* examination: There was much congestion of the brain with effusion into the ventricles; the brain-substance was but little softened.—*Third Division Hospital, Alexandria, Va.*

Case 2.—Private Edward P. McKee, Co. H, 98th Pa.; age 43; admitted from Finley hospital, D. C., May 19, 1865 suffering from the effects of sunstroke. The patient was very weak; his mental powers were obtuse and he spoke but little; he had incontinence of urine, torpid bowels and abdominal pain. On the 20th a blister was applied to the lumbar region and small doses of tincture of cantharides administered, for which in a few days nitro-muriatic acid was substituted. On the 29th the mental faculties seemed more obtuse and there was some congestion of the lungs; the tongue became dry and dark-colored, sordes collected on the teeth, the pulse and respiration increased in frequency and prostration became extreme. He died on the 30th. *Post-mortem* examination: Serum was found beneath the arachnoid and in the ventricles of the brain; the brain-substance was passively congested. The upper lobe of the right lung was hepatized, the upper lobe of the left congested. The right ventricle of the heart contained a fibrinous clot which extended into the pulmonary artery; the left contained a quantity of black uncoagulated blood. The spleen was healthy; the gall-bladder distended with black bile; the kidneys fatty; the intestines normal.—*Satterlee Hospital, Philadelphia, Pa.*

Case 3.—Serg't H. B. Graham, Co. C, 127th N. Y., had been exposed to the heat of the sun April 26, 1864, on which day he was admitted, unconscious, with dilated pupils and intermittent pulse, about 85, and a red and moist tongue. Next day he became conscious, but his replies were incoherent; he suffered from frontal headache, but his tongue and skin were moist. Mustard was applied to the back of the neck, and five drops of Magendie's solution, ten of Hoffmann's anodyne and one-fifth of a grain of tartar emetic were given three times daily. On the 28th he felt better and walked about the ward, but as his conversation was incoherent he was ordered to bed. His bowels were moved several times during the days which followed, but the brain symptoms remained unchanged until May 2, when a tendency to coma was manifested. On that day ten drops each of fluid extract of ginger and of laudanum were given twice on account of colic. He died comatose on the 5th. *Post-mortem* examination: Stomach congested and slightly eroded on its anterior wall near the greater curvature; similar appearances in the descending colon. Liver and spleen atrophied; gall bladder nearly empty.—*Hospital, Morris Island, S. C.*

CHAPTER X.—ON CERTAIN LOCAL DISEASES.

I.—CARDIAC DISEASES.

Organic affections.—According to the reported statistics organic disease of the heart was rare among our soldiers. Only 3,778 cases were registered as having been taken on sick-report among the white troops during the five and one-sixth years, and no doubt in many of these the disability existed before enlistment. But if the records of discharges on certificate of disability be examined it will be found that no less than 10,636 men were lost

to the service on account of heart disease. The difference between these numbers may be regarded as expressing in a general way some of the results of the 145,551 cases of acute rheumatism that were reported.

J. M. Da Costa has shown that of thirty cases of organic heart disease, taken indiscriminately from his note-books, one-half were attributable to rheumatism, six antedated the enlistment of the men, four were sequent to pneumonia, one to measles and two to the fatigue of hard marching, while in two no connection with antecedent disease or other probable cause was manifested.* This writer considered that pneumonia had no causative relation to heart disease. He referred the four cases in which a cardiac lesion followed the pneumonic affection to the predisposing influence of violent exercise, which, in his view, had as much to do with the development of endocardial inflammation as any exposure to which the men were subjected. But the pronounced pericardial lesions in cases 70–96 of the post-mortem records of pneumonia† suggest the possibility of the dependence of endocardial lesions on the influences that determine the progress of pneumonic fever. In the cases mentioned the condition of the endocardium was seldom stated, the attention of the observers having apparently been absorbed by the fibrinous clots adhering to the valves and interdigitating with the fleshy columns; nevertheless it occasionally appears on the record: In 77 the endocardium was said to have been unaltered; but in 82, 93 and 95 it was materially changed from the healthy condition.

The following notes on cardiac disease were filed by Act. Ass't Surgeon F. K. Bailey:

From October, 1862, to June 9, 1864, there were 631 admissions into my division at Quincy, Ill., and among them were forty-two cases of cardiac disease. Some of these were severe and involved the valves. There were also many cases of other diseases which were found to be complicated with cardiac symptoms. So many labored under **some affection of the chest in which dyspnœa and orthopnea were prominent symptoms, that it was necessary to provide extra pillows in order that the head and shoulders might be elevated. Indeed a great number required to** have the shoulders elevated who merely labored under the sequelæ of diarrhœa and other abdominal affections. **Enlargement of the liver or spleen, or effused fluid in the peritoneal cavity, caused an upward pressure on the diaphragm, which, being deprived of its tonicity, could not prevent mechanical pressure on the heart and lungs. There were cases of increased impulse and palpitation in which no organic lesion was detected; but the forty-two cases above mentioned were characterized by the physical signs of hypertrophy or other organic morbid condition. That** a similar state of things existed in other hospitals was evident from the fact that early in 1863 an order was issued advising a close scrutiny to prevent deception in certain cases, among which disease of the heart was included.

I do not know that much can be offered in regard to treatment. So many were discharged before the complete organization of a separate corps, in which men unfit for field duty could be made useful, that a full course of treatment was not tested. Many were broken down during the second year of the war by disease and exposure, and much care and good judgment were required to effect their restoration to health. These cases were now in many of their features, or at least disease assumed unusual forms as a consequence of the unusual circumstances which conspired in its causation. No case was found in which tonics were not called for. There was an adynamic condition which demanded supporting treatment. Sulphate of quinine or other preparations of cinchona, iodide of potassium and chalybeates were the leading therapeutic agents. Sedatives were particularly useful in relieving palpitation and paroxysmal dyspnœa. Rest in bed, with nutritious and easily digested food and such medicines as were called for by the symptoms, gave more or less immediate relief. Comparatively few cases proved fatal, and it is probable that most **of them have partially recovered and are now upon the pension rolls.**

Inasmuch as detailed histories of these cases are wanting, I can only give a general idea of their causes. The army was largely made up of all classes of men from the ages of sixteen to sixty. Instead of the rigid scrutiny exercised in recruiting the regular army, there was little regard paid to examining into physical defects which might incapacitate **for field service. The men were at once taken several degrees south of their own latitude and exposed to a** hot sun by day and a damp lodging at night. Thus the surface became chilled and internal determinations resulted.

During the summer of 1861 but little rheumatism was developed. In the following winter and spring the armies of the Missouri and Tennessee were constantly exposed to cold and dampness. The campaigns of Forts Henry and Donelson were accomplished under almost continuous storms of sleet and rain. **The battlefield of Shiloh and** the dreadful struggle on the Mississippi at Island No. 10 made cruel inroads upon the health of those who escaped the bullet. During the summer of 1862 there was much suffering from miasmatic disease and affections of the abdominal viscera. **Enlargement of the liver and spleen resulted, weakening the vital force and causing an impoverishment**

* On Certain Forms of Disease of the Heart noticed among soldiers, particularly the Organic Diseases, pp. 360 *et seq.*, *U. S. Sanitary Commission Memoirs.* [illegible]

of the blood. Long-continued debility produced a softening and flabbiness of the muscular tissues, in which the cardiac walls participated; hypertrophy resulted from overaction and dilatation from the softened condition. Peri- and endocarditis had perhaps already existed from an arthritic history, and scores of men were sent to hospital laboring under a pathological condition which was easy of diagnosis but uncertain of prognosis and perplexing in treatment.

A plausible theory, explanatory of the causation of some cases of cardiac disease in the army, was suggested by Surgeon L. D. KELLOGG, 17th Ill.: A soldier during the day carried his knapsack upon the back at a point immediately opposite the heart. At night the load was removed and the surface, which for hours had been subjected to profuse perspiration, was laid next the cold and damp ground. This often recurred to my mind while treating sufferers from thoracic diseases, both cardiac and pulmonic.

FUNCTIONAL DISTURBANCES.—Among the affections of the heart a functional disturbance known by the name of *irritable heart* or *cardiac muscular exhaustion* was the most notable product of the war. The unusual characters of this disease rather than its frequency made it the subject of observation and study.* HENRY HARTSHORNE, in speaking from his experience of the relative frequency of various cardiac affections among soldiers, states that acute endocarditis and pericarditis were rare; valvular disease and dilatation, without evidence of true muscular hypertrophy, occurred occasionally; palpitation from sympathy with gastric derangement, nervousness, the abuse of tobacco, etc., was more common and, as in civil life, often connected with the anæmic condition; but the largest number of cases consisted of those to which he applied the title *cardiac muscular exhaustion* as expressing the pathological characteristic of the affection. DA COSTA examined a series of three hundred cases of this functional disorder. Special facilities were required to enable him to have so large an experience. In December, 1862, he called attention to this form of cardiac malady, and arrangements were afterwards made by which cases of this kind were sent to his wards in the Turner's Lane hospital, Philadelphia. Here he demonstrated the transition from irritability to hypertrophy. In two hundred cases carefully examined there were twenty-eight of undoubted hypertrophy, one hundred and thirty-six of functional disorder and thirty-six of doubtful or mixed character in which irritability was passing into hypertrophy; he rarely discovered dilatation of the heart. The functional disorder was at first regarded as hypertrophy with dilatation. Dr. THOMAS T. SMILEY, in a communication dated October 15, 1862, says of cardiac diseases at Hilton Head, S. C.†

Hypertrophy and dilatation of the heart occur frequently, and in some instances aneurism of the aorta. They have occurred chiefly in very young men or in men of feeble constitution tasked probably beyond their strength. The history which most of them give of their symptoms is that they came on whilst engaged in practicing the *double quick*. Under the influence of digitalis, veratria, rest and mild diet, most of them have been partially relieved, but some have remained for several months in hospital, without any prospect of being able to rejoin their regiments.

Irritable heart appears to have been a result of active field service. It is true, cases were attributed to the drills and double-quick movements of camp, effected under the full burden of arms and accoutrements, particularly when the individual was debilitated, as from an attack of diarrhœa, or while convalescing from typhoid fever, but the greater number dated from some overaction of the heart during a particular battle or campaign. This was early observed by our medical officers in the field: thus Surgeon A. J. MCKELWAY, 8th N. J., referring to the battle of Williamsburg, May 5, 1862, says:—

Disease of the heart appears to have been developed in several cases from overexertion preceding the battle and excitement and effort during its continuance. In these cases the pulse remained for days at from 110 to 120 beats per minute. Some fifteen cases, which have since been discharged or sent to hospital, originated at that time.

Overaction of the heart during an engagement was due perhaps as much to nervous excitement and anticipation of danger as to overexertion. The recruit might control the

* See *Address before the Phila. Co. Med. Soc.*, February, 1863, by ALFRED STILLÉ; also HENRY HARTSHORNE—*On Heart Disease in the Army*—in the Trans. of the College of Physicians of Philadelphia.—*Am. Jour. Med. Sciences*, XLVIII, 1864, p. 89; and J. M. DA COSTA—*On Irritable Heart*—Ibid., LXI, 1871, p. 17.

† *Boston Med. and Surg. Jour.*, LXVII, 1863, p. 272.

movements of his voluntary muscles but not those of the sympathetically accelerated heart. Even soldiers accustomed to the alarms of battle were not at all times exempt from the results of mental impressions. The call to action usually dissipated the feelings which gave rise to this acceleration and substituted a beat of greater force, although perhaps not of lessened frequency if the exertion of the occasion was violent or prolonged. Many cases of irritable heart were received into the general hospitals after the continued exertion, anxieties and excitement of the seven days' fight from Richmond to Harrison's Landing, Va.

The affected soldier was subject to fits of fluttering cardiac action, accompanied with pain in the præcordia, shortness of breath and perhaps hæmoptysis, dizziness and dimness of vision; sometimes these were so severe as to occasion insensibility. At first overexertion or mental emotion was required to induce them, but in aggravated cases the slightest effort sufficed to call them forth. Sometimes even sleep did not protect the patient from an attack, which seemed to be excited in many cases by lying on the left side. The pain during a paroxysm of accelerated action was acute, sometimes radiating to the left axilla, arm or shoulder-blade; during the intervals there was a feeling of uneasiness, discomfort or dull pain. The pulse, which was rapid, feeble and compressible when the patient was at rest, became greatly accelerated by slight movements. HARTSHORNE speaks of men possessing the aspect of average health, with sufficient flesh, fair color and considerable muscular strength, whose pulse ran up to 120 or 130 on slowly walking a few yards. In the case of Baily, given below, the irritable pulse rose from 120 to 174 when the patient walked the length of the ward. The impulse of the heart differed from that in ordinary palpitation by its relative deficiency in force. The first sound, according to DA COSTA, was generally lacking in volume, feeble or short and valvular. As recovery ensued it gradually recovered its normal characteristics, even although it had been almost extinct when the functional disorder was at its height. The second sound was generally increased and always very distinct. When irritability gave place to hypertrophy the impulse gathered volume and began to be forcible, the first sound lengthened and lost its valvular character, the second became less distinct, the action of the heart less rapid, the pulse fuller; the cardiac pain lessened, but the respiration, although it came to bear a more natural proportion to the still excited action of the heart, was persistently oppressed; finally, but gradually, the boundaries of percussion dulness became markedly extended.

Rest constituted the essential of treatment; tonics and diet the adjuvants. Of the special remedies employed digitalis gave the best results; in anæmic cases it was usually combined with iron. Ten drops of the tincture were given three times daily and continued, with slight intermissions, for weeks and months without evincing any evidence of cumulative effects. In slight cases this remedy lowered and steadied the pulse in about a week, and gradually led to a permanent improvement. In severe cases its action was slower, but ultimately as decided. In some cases, however, it failed. Aconite was valuable when hypertrophy was in progress. It reduced the force of the heart and lessened the tension of the pulse. Veratrum viride often calmed the cardiac irritability, but its action was not permanent like that of digitalis. Belladonna was particularly valuable in cases of irregular action, but in irritability without irregularity or in hypertrophic cases it was seldom of use. Other remedies tried, such as gelseminum, hyoscyamus, conium, cannabis indica, valerian, ergot, strychnia, etc., while not absolutely valueless, failed to give decided results. Belladonna applied externally relieved pain; cups and blisters were useless.

The progress to recovery was slow—months of rest and treatment in hospital failed in many cases to do more than improve the condition of the heart. Nevertheless 38 per cent. of the two hundred cases treated by Dr. DA COSTA were returned to duty with their regiments after having been tested by running and other exercises, and the cure in many of these is known to have been permanent.

Of 4,901 men discharged for disability at Convalescent Camp, Va., during the early part of 1863, 2,323 cases, or nearly one-half, were certified on the ground of heart disease: 1,123 are said to have been organic and 1,200 functional. Surgeon SANFORD B. HUNT, U. S. Vols., a member of one of the examining boards, speaks thus of these cases of "functional disease of the heart:"

The term is a misnomer; yet, as I have already shown, it was employed in 1,200 certificates of disability. In all cases the objectionable phrase described a heart far too rapid in its action, the pulse ranging from 120 to 150, frequently attended by dyspnœa, vertigo or syncope, but revealing no abnormal sounds either on percussion or auscultation. The convenience of this collocation of words was perhaps the strongest reason for its employment. It saved an extended historical notice of each case upon the limited space of the certificates of disability. In reality these were cases of disturbance of the function of the heart dependent upon causes foreign to the organ itself. Thus, the soldier who has been prostrated with Chickahominy diarrhœa, with typhoid or remittent, and whose ganglionic system had been stupefied and ruined by the specific effect of too much quinine, would have left to him a rapid pulse after the subsidence of the diarrhœa or the fever. The effect was thus put before the cause, and the man was certified for "functional disease." Again, there were great numbers of cases of the effects of miasm, as shown in enormously enlarged livers and spleens and a tumid belly. It would have been more accurate to have certified these as they were, viz: enlargements of the liver and spleen from miasmatic causes, with disturbed function of the heart from mechanical pressure of the diaphragm and impaired action of the inferior vena cava. But there was not space or time for all this. It was enough that the man had been sick for six or eight months; that a full year north would be required to restore him, and that a second season south would make him the easy victim of pernicious intermittent. He stood there a bad bargain for the government; and in the toil of getting through the task of one hundred examinations daily, to make up one's mind that the man ought to be discharged puts an end to all niceties of diagnosis.

Such is the history of these cases. Without entering into an apology for the action of the different boards in discharging them I wish to remark that, unless the examining surgeons were incompetent to perform the more ordinary duties of their profession, it is fair to suppose that they knew what they certified to. So far as organic disease is concerned, the diagnosis of the mere fact is not difficult. A valvular murmur, a diffused impulse, an enlarged area of percussion, a friction sound in the pericardium cannot be feigned and are as easily recognized as any other physical sign. It is only when we come to sub-classify, when we assign the sound to a particular valve, as none of the examining board did, that diagnosis becomes nice and difficult. Much has been said about the use of deception in those cases classed as "functional." I do not defend the use of that term; but what was the man to feign? A rapid pulse, and that only. As a surgeon, I know only one successful method of producing this, that used by fraudulent mesmeric subjects of quietly straining as if at stool. This could not be pursued in the examining room, and it is only in very sensitive individuals that the pulse can be forced above 110 by this trick; moreover the man could not feign the tumid belly, enlarged liver and spleen, or the cachectic look, which are what "functional disease" means. While writing this article I have re-examined many of these cases which were sent to quarters, and I found the action of the heart almost unchanged, though three months have elapsed.

The cases of heart disease seen by Surgeon M. K. TAYLOR, U. S. Vols.,* in the hospitals at Keokuk, Iowa, were of a wholly different character from those studied in the Philadelphia hospitals. As shown by the symptoms, physical signs and *post-mortem* observations, they consisted of dilatation and thinning of the walls of the right ventricle, with more or less incompetency of the tricuspid valve. Sudden death occasionally occurred in these cases. The cavity of the right ventricle was fully twice the size of the left, and its walls, in some places scarcely more than three-quarters of a line in thickness, presented sometimes a bluish appearance on their pericardial surface. Nine-tenths of those affected had suffered from some impediment to the free circulation of the blood at no very remote period. Sometimes the obstruction depended on consolidation of the lung-tissue, as in pneumonia, or on compression, as in pleurisy, but in by far the larger number of cases it resulted from inflammatory con-

* *Remarks on Heart Disease as observed in the Military Service from 1861 to 1865, inclusive*, by M. K. TAYLOR.—*Transactions American Medical Association*, XVIII, 1867, p. 139.

ditions following measles. Scurvy and malarial poisoning were regarded as predisposing causes. The affection in other instances was ascribed to sudden and undue burdens imposed on the heart by rapid marching or the overwhelming fatigues and excitements of battle. Many of the patients stated explicitly that the first evidence they had of any cardiac ailment was immediately after such excitements. Treatment was based on the history of the disease and the existing condition of the patient: Exercise and diet were so regulated as to restore the tone of the muscular structures; iron and bitter tonics were employed with moderate alcoholic stimulation after meals. Many recovered a fair degree of health who, without medical supervision, would probably have died prematurely. Dr. TAYLOR considered that in these favorable cases the muscular tissue of the heart became so far invigorated as to permit of the contraction of the ventricular cavity to its normal size.

DA COSTA'S article on irritable heart is illustrated by many interesting cases. The following, from unpublished records, indicate the general characters of this functional disorder:

CASE 1.—Private Asa L. Ricker, Co. C, 32d Mass.; age 21; was admitted Aug. 10, 1862. He was in the seven days' fight in June before Richmond, during which he contracted fever, probably typhoid, from which he was recovering when brought here. Convalescence has been retarded by palpitations which are independent of any appreciable organic lesion. Ten drops each of the tinctures of digitalis and iron were given three times daily, with generous diet. He improved somewhat, but prolonged or violent exertion caused a recurrence of the palpitations. On Jan. 20, 1863, there was a slight bloating of the face, which led me to suspect some disease of the kidney; the urine, however, proved to be normal. On February 9 Dr. DA COSTA examined the patient, coinciding in the diagnosis and approving the treatment pursued. An application for his discharge was denied, and in March he was transferred to another ward for duty as a clerk.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 2.—Private Oscar Schreiber, Co. M, 4th N. J. Cav.; age 25; suffered from cardiac trouble before entering the army. In March, 1863, he had pain in the præcordia. He was admitted May 7 with irritable heart: No abnormal sounds over chest; cardiac pain, increased on motion; impulse of heart frequent; appearance good; tongue slightly coated. Iodine was at first used and a stimulant liniment afterward. He spat blood on the 19th. Sulphuric acid was given. He was returned to duty June 15.—*Satterlee Hospital, Philadelphia, Pa.*

CASE 3.—Private James B. Bruce, Co. M, 8th N. Y. Cav.; age 38; was admitted Dec. 18, 1862. He says he suffered from bilious fever for a month previous to his entrance; evidently he had been the subject of some severe illness which had much reduced his strength and given rise to palpitation of the heart. The percussion sound was somewhat less clear and the vesicular murmur less distinct than normally; the apex of the heart was displaced downwards and inwards, giving rise to pulsation in the epigastrium; no murmur was discovered. From an extended cardiac dulness and feeble condition of the pulse I considered the heart slightly dilated. Some years ago this man had a severe attack of pleurisy, during which dislocation of the heart and adhesion of the two surfaces of the pleura may have taken place, giving rise to the conditions above noted. The tinctures of iron and digitalis were administered, but little benefit was derived. He was discharged the service Feb. 28, 1863.—*Satterlee Hospital, Phila., Pa.*

CASE 4.—Private Elias Schmidt, Co. A, 4th Mich. Cav.; age 23; was taken in April, 1862, with pain in the left side and shortness of breath; since then he has been unable to do duty. He was admitted March 10, 1863, with dull pain in the præcordia and dyspnœa; pulse feeble and frequent; appetite good; bowels regular. Alteratives and strychnia were given and wet cups applied over the heart. He was returned to duty July 27.—*Hospital, Quincy, Ill.*

CASE 5.—Private Michael McGonegal, Co. I, 15th Pa. Cav.; age 23; was taken with palpitation of the heart in December, 1862, and has done no duty since that time. He was received March 10, 1863. Auscultation revealed no organic disease. He improved under the use of strychnia internally and iodine externally, with nutritious diet and a careful avoidance of stimulants. He was returned to duty August 10.—*Hospital, Quincy, Ill.*

CASE 6.—Private A. C. Smith, Co. K, 95th Ohio; age 29; was attacked with palpitation of the heart Aug. 1, 1862, attributed to over-exertion in marching. He was received March 10, 1863. Exercise or overloading the stomach brought on dizziness and palpitation; no organic disease was discovered. He was treated with strychnia and cinchona, with epispastics to the spine and iodine to the præcordia. His condition was much improved when, in May, he was transferred to Camp Chase, Ohio.—*Hospital, Quincy, Ill.*

CASE 7.—Private James Curley, Co. K, 2d N. H.; age 24; admitted from the field April 6, 1864, with hypertrophy of the heart. He was unable to take exercise without suffering from palpitation and dyspnœa; pulse full and regular; appetite good; bowels costive. Gave fluid extract of valerian, and at times, when the palpitation was excessive, small doses of digitalis; occasionally an aperient. He was discharged August 1.—*Hospital, Point Lookout, Md.*

CASE 8.—Private William Bailey, 6th N. Y. Cav.; age 29; enlisted Aug. 1, 1862, and was sent to Camp Convalescent, near Alexandria, Va. Here he took cold by sleeping on the ground with insufficient covering, and was so ill as to be for a time under treatment in one of the general hospitals. In October, having joined a portion of his regiment which was then in Washington, he was severely jolted in trying to mount an unruly horse. The injury seemed to him to be somewhere in the abdominal walls. About a month afterward he was sent to Philadelphia to this hos-

pital. On admission, November 12, he was a good deal debilitated; pulse rapid; tongue coated; expression of pain on his face; great tenderness with marked tympanites of the abdomen, and diarrhœa recurring every few days; appetite fair. He was treated with tonics, cod-liver oil, anodynes and nourishing diet. In January, 1863, he was put on digitalis as his pulse continued to range above 130. On February 20, when he was ordered to be discharged, his abdominal symptoms had left him and he was in good condition otherwise, except that his pulse remained over 120, rising to 174 when he walked to the end of the ward and back. I was unable to define accurately the source of the mischief in this case. The patient had not, according to his own account, had a distinctly malarious fever, nor had he while under my care a fully developed peritonitis. His heart was in no respect abnormal except in its irritability, which did not seem to arise from the state of the blood, nor was there any evidence of disease in any other organ.—*Act. Ass't Surgeon John H. Packard, Satterlee Hospital, Philadelphia, Pa.*

IDIOPATHIC PERICARDITIS.—Most of the recorded cases of pericarditis have already been submitted as incidental complications of general diseases or the specific manifestations of a blood-poison on the serous lining of the sac.* There remain, however, a few cases in which the general disease is not defined. Whether these were truly cases of idiopathic pericarditis is uncertain.

CASE 1.—Private Martin O'Brien, Co. E, 43d N. Y., was admitted Aug. 10, 1862, with intermittent fever. He died September 9. *Post-mortem* examination: Body large and of vigorous appearance; age about 55. The tracheal and bronchial mucous membranes were inflamed and the bronchial glands enlarged, one opposite each sternoclavicular articulation containing a purulent accumulation. The pleuræ and lungs were healthy. The pericardium was injected, roughened and bathed with pus; the right ventricle contained a white clot. The liver and spleen were normal. The kidneys were small, rather lobulated and of a pinkish-cream color on the surface mottled with purple; the cortical substance was fatty, but the microscope revealed much less oil among its cells than was anticipated from the color. The ileum was inflamed and eroded in patches, but its glands were healthy. The cæcum was inflamed and the mucous membrane of the sigmoid flexure and rectum was much corrugated, the summit of the rugæ being deeply injected; the solitary glands were natural.—*Act. Ass't Surgeon J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

CASE 2.—Private Eli Joslyn, unassigned recruit; admitted April 24, 1865. Diagnosis—typhoid fever. Died May 2. *Post-mortem* examination: Right lung firmly adherent; left normal. Pericardium containing twenty ounces of purulent serum. Abdominal viscera healthy.—*Depot Field Hospital, Sixth Army Corps.*

CASE 3.—Private Isaac Givens, Co. K, 101st Ind.; age 42; admitted Nov. 28, 1864, suffering from cough, dyspnœa and pain in the præcordia; he was quite feeble, anæmic and aphonic. For two months, during which he was treated with anodynes, antispasmodics, expectorants and stimulants, no marked change occurred, but on Feb. 12, 1865, a double murmur was heard with the heart-sounds, and the patient's discharge from the service was ordered. On the 16th he had a chill, followed by severe lancinating pain in the left side, with great dyspnœa, cough and expectoration of viscid, glairy mucus. Next day there was dulness over a large part of left side of the chest. Five grains of Dover's powder with three grains of quinia were given every four hours and one ounce of whiskey every two hours. On the 18th the area of dulness was increased, the heart-sounds were obscured and coarse râles were heard over the greater part of the chest; sputa tenacious. Profuse sweating occurred during the night of the 19th. A blister was applied over the heart. On the 20th half a grain each of calomel and opium was given every three hours. The patient felt somewhat better until the 24th, when the dyspnœa again became urgent and the sputa tenacious, threatening suffocation. Carbonate of ammonia and whiskey were administered. He died on the 26th. *Post-mortem* examination: The brain was not examined. The pericardium, which adhered externally to the pleura and other surrounding parts, contained eighty ounces of purulent serum; the surface of the heart was much thickened and corrugated by an apparently organized exudation; the walls were softened, friable and fatty; the cavities on both sides contained fibrinous clots; the mitral and aortic valves were thickened. The lungs were much congested, the trachea filled with muco-pus and the vocal chords thickened and altered. A calcareous tubercle the size of a hickory nut was found in the posterior mediastinum. The liver was soft, friable and fatty; the spleen congested and softened; the kidneys together weighed twenty-two ounces but appeared healthy; the other organs were normal.—*Hospital, Madison, Ind.*

CASE 4.—Private Arnold Willet, Co. D, 96th Ill.; age 28; admitted Oct. 17, 1863. Died 28th. *Post-mortem* examination: Body moderately emaciated; legs somewhat œdematous. The brain was not examined. The heart was coated with lymph and the pericardium largely distended with serum; the mitral valves were enlarged and indurated. The apex of the right lung was solidified. The liver was congested; the spleen flabby; the left kidney dark-colored; the bladder much distended. The colon was attached by recent adhesions and the coils of the small intestine were interadherent. The mucous coat of the stomach was softened and of a yellowish color; the small intestine was of a soiled yellow color; the colon dark-green; the mesenteric glands enlarged.—*Hospital No. 1, Nashville, Tenn.*

CASE 5.—Private Henry W. Todd, Co. H, 20th Conn.; admitted April 17, 1863. He was debilitated and complained of pain in the left side of the chest, extending down the left arm; his sleep was dreamful and unrefreshing. He died August 24. *Post-mortem* examination: The heart was coated and the pericardium lined with large quantities of tough lymph; the tissues around the base of the heart were agglutinated,—[*Specimen* 655, Med. Sec., Army Medical Museum].—*Act. Ass't Surgeon L. D. Wilcoxson, Knight Hospital, New Haven, Conn.*

CASE 6.—Private Samuel Chealley, Co. H, 5th Iowa Cav., was admitted Dec. 8, 1862, with gonorrhœa. Four

* See *supra*, pp. 148, 428, 465, 594, 610, 759, 768, 781, 805 and 810.

days before death he complained of a severe pain in the præcordia, which he said had troubled him frequently for some months. The heart was carefully examined, but, excepting a little irregularity and obscurity of the sounds, nothing abnormal could be discovered. The patient continued to go about until the morning of the 18th, when, after an ordinary breakfast, he lay down on his bed and was found dead shortly afterwards. *Post-mortem* examination: The brain was not examined. The pericardium was filled with turbid yellow serum and shreds of lymph; its lining membrane was much injected, and upon the surface of the heart were spots of old organized fibrin. There were some pleuritic adhesions and some bands over the spleen; otherwise the various organs were healthy.—*Surgeon B. Darrach, U. S. Vols., Hospital, Benton Barracks, Mo.*

Case 7.—John W. Shelton, Co. C, 27th Miss.; age 35; admitted April 27, 1864, complaining of dyspnœa and pain in the cardiac region. The pulse was full, quick and hard, and there was dulness with friction sounds over the heart. He died twelve hours after admission. *Post-mortem* examination: Heart partially adherent to pericardium; sac containing effused liquid; walls of heart thickened; mitral orifice slightly contracted.—*Act. Ass't Surgeon M. K. Gleason, Rock Island Hospital, Ill.*

Case 8.—Private John W. Manson, Co. H, 149th Pa.; age 22; received May 11, 1865, from Filbert street hospital. He was much debilitated and had pain and oppression in the cardiac region. He died on the 15th. [This man was admitted June 23, 1863, into McClellan hospital, Philadelphia, where he remained under treatment for chronic bronchitis until April 12, 1865, when he was transferred to Filbert street.] *Post-mortem* examination: The lungs were much congested. The pericardium contained about a quart of serum; the heart was enlarged and its surface roughened; the left cavities contained a dark clot and the right cavities a yellow fibrinous clot. The kidneys were congested. The other organs were normal.—*Satterlee Hospital, Philadelphia, Pa.*

Rupture of the Heart.—Notwithstanding the excitation to which the muscular substance of the heart was subject in the exhausting exercises of the field,—notwithstanding, also, the irritable condition just described, the flaccidity and degeneration so common after attacks of typhoid and other adynamic fevers, and the dilatation, believed by Taylor to be consequent on pulmonary obstructions,—rupture of the heart must be considered as phenomenal. The following is the only recorded case:

Private William Sands, Co. A, 147th Pa., was admitted May 7, 1863, with a flesh-wound of the thigh, received at Chancellorsville on the 3d. The patient seemed in good condition and complained of nothing apart from his wound. On the morning of the 15th, Dr. A. P. Williams having been called to see him, found him so near death by asphyxia that no opportunity was afforded to examine the chest during life. At the evening visit on the previous day the patient had some fever and complained of restlessness, for which an opiate was administered. About midnight his mind wandered somewhat, but not more than might be attributed to the opiate. After this the nurse on duty noticed that his breathing was short and somewhat labored; but as he was quiet and made no complaint the attending surgeon was not called. *Post-mortem* examination: The ball, which had impinged on the femur without fracturing it, was removed from the wound, which showed nothing unusual. On elevating the sternum the thoracic cavity was found filled with black blood. The lungs adhered to the walls of the thorax and the diaphragm; the pericardium to the pleura and the diaphragm; these adhesions were firm and extensive. The heart, enveloped in its pericardium, was carefully removed; the pericardium was firmly adherent to the heart. An opening nearly half an inch in length was found extending through the anterior wall of the right ventricle and its adherent pericardium. On stripping off the pericardium the heart, which was of large size, appeared paler than natural, having evidently undergone fatty degeneration; the opening in the wall of the ventricle was in the direction of the muscular fibres and was rendered valvular by the intrusion of one of the fleshy columns. Every point in the case shows that the cause of death was rupture of the heart not following any violent exertion. The nurse's statement that he noticed the short breath of the patient some hours before death, and his asphyxiated appearance when Dr. Williams saw him, indicate that death was caused by the gradual effusion of blood compressing the lungs. The man probably lived four or five hours after the rupture of the heart, the columna carnea at the base of the opening preventing an immediately fatal hemorrhage. The opening in the pericardium and heart could scarcely have been made by the knife of the dissector without inflicting injury on the fleshy column at the base of the opening, which, it will be observed, was uncut; nor would the chest have been suddenly filled with blood by a *post-mortem* cut in the right ventricle, in which was found a large soft clot.—*Ass't Surgeon Alexander Ingram, U. S. A., St. Aloysius Hospital, Washington, D. C.**

There occurred in army practice many sudden deaths which were attributed to the failure of a relaxed or degenerated heart or to the development of fibrinous concretions within its

* Rupture of the heart, as shown by Richard Quain in his article *On Fatty Disease of the Heart,—Medico-Chirurgical Transactions*, London, 1850, p. 154,—is a not unfrequent termination of fatty or other degeneration of its muscular structure; in a series of 83 cases of fatty heart, death occurred by rupture in 28. Of 19 cases collected by Bayle, 14 were in the left ventricle, 3 in the right, 1 at the apex and 1 in the septum.—*Cyclopedia of Practical Medicine*, II, 1845, p. 410. In 52 cases by Gluge, the left ventricle was the seat in 37, the right in 8, both in 2, the right auricle in 2 and the left in 3.—*Atlas der Pathol. Anat. Ite Zerreissung des Herzens*, p. 2), Jena, 1843. The rupture is usually suddenly effected and death is correspondingly sudden in its advent, the action of the heart being overpowered by the accumulation of blood in the pericardium. Sometimes, however, death is delayed for many hours. Wardrop gives a case in which life continued for thirty hours after the manifestation of the first symptoms of the lesion, which was situated close to the apex of the right ventricle and so small as hardly to give passage to an ordinary pin.—*Diseases of the Heart and Great Vessels*, London, 1873, p. 114. Flint has known death to be delayed for six hours after the occurrence of symptoms indicating rupture, life having been prolonged by the temporary closure of the perforation by means of a clot.—*Practice of Medicine*, 1864, p. 358. According to Walshe the fissure is usually in the line of the main fasciculi of the cardiac fibres.

cavities: but in the following case, reported by Dr. LEIDY, neither of these conditions appears to have been present:

Private Edward Hibbard, Co. I, 211th N. Y., was admitted Aug. 10, 1862, with disease of the heart. He fell dead suddenly on the 15th, while standing listening to a preacher on the hospital grounds. *Post-mortem* examination: Body vigorous; age about 40. There was about one gill of liquid in the pericardium, but no evidence of disease of the heart. The lungs also were healthy, nor could any lesion be detected in the abdominal viscera. Except a more than usually bloodless condition of the pia mater, the brain was likewise healthy in appearance. Of what did this man die? Was it merely an emotion?

ANEURISM.—SMILEY referred the occurrence of aneurism of the aorta to the overtasking of young or enfeebled men beyond their powers of endurance. The accuracy of this observation cannot be verified by the data at command; but it seems highly probable that the violent cardiac action, frequently incident to active service, was the cause of sudden death in these aneurismal cases. A few instances of rupture appear on the records:

CASE 1.—Private Patrick Fletcher, Co. H, 4th U. S. Cav.; age 42; died suddenly while in camp, Dec. 9, 1863. He had not been at surgeon's call during his service of over ten months in this regiment, but a comrade stated that he would occasionally place his hand to his side, complain of pain, and remark that he would die of disease of the heart. He had previously served five years in the 3d Art'y and five years in the 2d Inf. On the day before his death he marched with his regiment a distance of twenty-five miles. It rained all day and was very cold, nearly freezing. He, like every one else, had to sleep on the ground in wet clothes. Next morning a march of five miles was made and the regiment went into camp. Fletcher, while assisting to pitch a tent, fell down and, gasping once or twice, died. *Post-mortem* examination: Neck swollen as though the bloodvessels were engorged. The pericardium was smooth and healthy, but was enormously distended with twenty-six ounces of blood-clot and serum. The heart was of natural size, but the walls of the left ventricle were thicker while those of the right appeared somewhat thinner than usual; the endocardium and valves were healthy. In the aorta, about an inch and a half above the valves, was an aperture a quarter of an inch in diameter, opening into an aneurism the size of an egg, the walls of which adhered firmly to the superior cava and pericardium and were as thick as those of the aorta itself except at a point where rupture had taken place into the pericardial sac,—[*Specimen* 965, Med. Sec., Army Medical Museum]. The left pleura was adherent and the lung engorged with venous blood; the right lung was healthy, although much compressed by the liver, which was so engorged as to reach the lower border of the third rib. The spleen was enlarged; the kidneys healthy.—*Act. Ass't Surgeon Thomas Bowen, 4th U. S. Cav.*

CASE 2.—Private William Cunningham, Co. A, 1st Md.; age 22; while on guard, June 27, 1865, fell to the ground insensible and expired in a few minutes. It was reported that for some time before his death he suffered much from mental depression. *Post-mortem* examination: There was great venous congestion of the brain and lungs, with distention of the large vessels of the neck. The pericardium was distended with blood which had escaped from a small aneurism of the aorta situated just above the semilunar valves; the sac of the aneurism communicated also with the pulmonary artery. [*Specimen* 558, Med. Sec., Army Medical Museum.]—*Surgeon Aaron Ansell, 1st Md.*

CASE 3.—Private William Robinson, Co. C, 5th Pa. Reserves, was admitted Feb. 19, 1863, with a dislocated ankle. He died suddenly, March 26. *Post-mortem* examination: Body well nourished. The brain and lungs were healthy. The pericardium was much distended by six ounces of reddish serum and a clot, nine ounces and a half in weight, completely surrounding the heart; the right auricle was thinned towards its appendix; the lining membrane of the left auricle was pale and roughly areolated; the cardiac valves were healthy. The aorta was congested and atheromatous, as were the great vessels arising from its arch. On the posterior surface of the aorta, about two inches from the semilunar valves, was an aneurismal tumor with a cavity as large as a black walnut, communicating by a minute valvular opening with the pericardium.—*Lincoln Hospital, Washington, D. C.*

CASE 4.—Private Charles Willman, Co. G, 1st Mo. Art'y; age 32; was admitted Oct. 27, 1863, with aneurism of the abdominal aorta, for which he had been under treatment for four or five months in Nashville. On admission he complained of severe pain, with constant throbbing in the epigastric region. An oval tumor, not so large as a hen's egg, was felt pulsating immediately below the ensiform cartilage, where a bellows murmur was heard. A soft bellows murmur was also heard over the apex of the heart, growing louder towards the base and the root of the left lung. There was bronchial respiration with pectoriloquy at a circumscribed spot below the clavicle; the patient had also some cough. Milk diet was prescribed, with morphia to relieve pain. During November the epigastric pain continued severe and extended through to the back. The patient was compelled to remain constantly in a recumbent position, feeling easiest when lying with his head bent down between his knees. He sometimes required as much as two and a half grains of morphia in twenty-four hours to relieve the pain. On December 6 he was seized with sudden and severe convulsions, accompanied with great pallor and loss of consciousness. He continued in this condition until death on the morning of the 7th. *Post-mortem* examination: The left lung was bound by old adhesions; its apex contained a cavity and a number of tubercles. The aorta presented two aneurismal dilatations,—[*Specimen* 502, Med. Sec., Army Medical Museum],—one, about the size of an orange, at the arch, involving the great vessels, the other, of larger size, in the abdomen surrounded by much clotted blood which had escaped from a rupture in its coats. The bodies of the last dorsal and first lumbar vertebræ were extensively eroded by the pressure of this sac.—*Surgeon Alexander T. Watson, U. S. Vols., Clay Hospital, Louisville, Ky.*

CASE 5.—Private George Blake, Co. C, 7th Conn.; age 29; was admitted from Hilton Head, S. C., June 29, 1863, with a pulsating tumor, apparently about three inches in diameter, just above and to the left of the umbilicus; an aneurismal bruit was heard over it. The patient first noticed the swelling after an extra effort in lifting heavy boxes some months before. He had not much pain, but was feeble, sleepless and without appetite. Treatment consisted in the use of tonics, stimulants and nourishing diet, with occasional opiates. Death took place suddenly, August 7. *Post-mortem* examination: The cavity of the abdomen was filled with blood from the ruptured aneurism. [*Specimen* 545, Med. Sec., Army Medical Museum.]—*Act. Ass't Surgeon D. L. Dagg't. Knight Hospital, New Haven, Conn.*

On the other hand, it may be questioned whether the feebleness of the circulation induced by debilitating camp diseases, as chronic diarrhœa, did not, under certain circumstances, favor the progress of conservative changes in the aneurismal sac. In the following case the walls were extensively thickened by deposits of lamellated fibrin, and in a case reported by J. L. OLIVER as having occurred in his ward at Mill Creek hospital, Fort Monroe, Va., a solidified aneurismal tumor was found on the aortic arch of a man who died of an exhausting diarrhœa.*

CASE 6.—Private James McFarland, Co. A, 22d Ill.; age 24; was admitted June 22, 1863, much emaciated from diarrhœa of some months' duration. A pulsating tumor was observed in the umbilical region immediately in the track of the aorta, but on careful examination it was found to be susceptible of lateral displacement to a considerable extent: towards the right it could be pushed over into the lumbar region. The patient became exhausted by the diarrhœa, and died July 1. *Post-mortem* examination: The small intestine was extensively ulcerated. The superior mesenteric artery was dilated into a spherical aneurismal tumor the size of a small orange. [*Specimen* 503, Med. Sec., Army Medical Museum.]—*Act. Ass't Surgeon B. F. Grant, Hospital No. 1, Hueysville, Ky.*

II.—MORBID CONDITIONS ATTRIBUTED TO THE WEIGHT OF THE ACCOUTREMENTS.

HÆMOPTYSIS was so prominent a symptom in some cases of consumption that it was occasionally made their diagnostic title on the hospital case-books. There occurred, however, certain cases of hemorrhage from the lungs in which tubercular disease was absent or not manifested by its usual signs: In cases of irritable heart, the expectoration was sometimes tinged with blood during and after a paroxysm of accelerated cardiac action and oppressed breathing. In other instances hæmoptysis was apparently connected with injury from various causes, as from contusion by blows or falls, strains in lifting, etc. In many cases the soldier, and frequently the medical officer, attributed the hæmoptysis to exercise under the weight of the knapsack and pressure of the belts; and, among cavalrymen, hard riding was sometimes suggested as a cause.

ALFRED STILLÉ of Philadelphia, in a special report dated March 1, 1863, gives a brief account of seven cases of hæmoptysis apparently unconnected with pulmonary consumption. The records of the Quincy hospital, Illinois, furnish two cases; but in one of these, Carnaby, the subsequent history of the individual shows him discharged from service March 12, 1865, because of phthisis pulmonalis, and in the other, Moss, the terms of the record cast a doubt on the character of the case, inasmuch as hæmoptysis was occasionally selected by the malingerer as the ailment by which to lengthen his stay in hospital or secure his discharge from the service. The cases are as follows:

CASE 1.—Private Alpheus Fuller, Co. G, 16th Me., a tall and muscular man, entered the ward Sept. 27, 1862. He stated that in lifting a heavy log he strained himself and was attacked with pain in the left side and hæmoptysis. The blood at first was abundant and of a dark color, but gradually diminished in quantity and was mixed with mucus and saliva. The chest presented signs of chronic pleurisy of the left side, confined to the lateral and anterior

* The patient was extremely emaciated and his mind [illegible] He had [illegible] difficulty in breathing, the nostrils dilating widely during inspiration. He had contracted diarrhœa during the Peninsular Campaign. His general appearance, circumscribed roughened mucous expectoration led to a suspicion of phthisis, but auscultation discovered none of the physical signs of that disease. Astringents, aromatics and stimulants were administered on account of the exhausting diarrhœa, but although they seemed to give temporary relief the patient sank gradually and died about ten days after his admission. [illegible] lungs. [illegible] spherical tumor, about three inches in diameter, was discovered on the posterior aspect of the arch of the aorta, compressing the trachea. Upon cutting into this tumor it was found to be a large aneurism the cavity of which had been filled by layers of lymph, the layers distinct and arranged like the coats of an onion. The validity of the [illegible]

regions, and was the seat of constant pain or a sense of constriction. His general health had improved, but the condition of the side and the hæmoptysis were unchanged at the time of his discharge, Feb. 4, 1863.

Case 2.—Private David Cunningham, Co. C, 12th U. S. Inf., entered Nov. 8, 1862, convalescing from intermittent and typhoid fevers. About the commencement of the latter disease he had an attack of hæmoptysis after stooping and straining. For some weeks past he has expectorated more or less blood every day, in the morning mixed with mucus and in the afternoon clear. He is also becoming shorter of breath and losing flesh and strength. He was discharged Feb. 10, 1863, having had repeated hæmoptysis, with progressive loss of flesh, but without any definite physical signs of pulmonary tubercle. [From the case-book we find that the quantity of blood brought up by this patient was about half an ounce daily, and that the respiratory murmur lacked clearness on both sides.]

Case 3.—Private John Weidness, Co. I, 1st N. Y., entered Nov. 13, 1862, suffering from chronic diarrhœa and chronic pleurisy of the right side. On the 23d he had hæmoptysis, was much emaciated and coughed and expectorated mucus; but under cod-liver oil and astringents, with good diet, his flesh and strength gradually improved, although from time to time he brought up blood. Feb. 28, 1863: The signs of chronic pleurisy persist; the diarrhœa is much reduced, the cough diminished and no physical sign of tubercle can be detected. His general nutrition is good. [The physical signs as recorded in the case-book, under date December 28, are dulness, greater on the right side than on the left, mostly below; respiration feeble; no bronchial respiration or rhonchus; liver depressed; costal cartilages prominent at epigastrium.]

Case 4.—Private Hiram Morse, Co. C, 23d N. Y., entered Dec. 18, 1862, having had hæmoptysis for several months, which he attributed to the weight of the knapsack and cartridge-box. He was rather thin but not cachectic. His general health improved. At the present time he presents no physical signs of tubercle except a slightly diminished respiration at the apex of the right lung. He alleges that he continues to spit blood, but in small quantities. [The case-book shows that this man was returned to duty March 7, 1863.]

Case 5.—Private Abernetha Grundyke, Co. G, 15th N. J., entered Dec. 18, 1862, complaining of pain in the right side, which is dilated and dull on percussion in its lower half. He has had no active symptom but hæmoptysis, for which no special cause is assigned except the weight of the knapsack and cartridge-box. The quantity of blood expectorated is small, but it is frequently discharged. His general appearance and flesh have decidedly improved. [The case-book, December 31, records the signs as: Right side developed fully an inch more than left at level of nipple, below which there is dulness and diminished respiratory murmur but no rhonchus. March 15, 1863: Recommended for discharge on account of chronic pleurisy and hæmoptysis.]

Case 6.—Private George McAnally, Co. E, 155th Pa., entered Dec. 12, 1862. In June he was injured by his horse falling upon him, after which he became subject to hæmoptysis, and was subsequently attacked with typhoid fever. Since his entrance he has suffered from palpitation of the heart, general debility, nervous trembling and constant pain in the left side beyond the heart, at which point there are signs of chronic pleurisy; but the chest presents no physical signs of heart disease or of phthisis. He was discharged Feb. 26, 1863. [The case-book does not mention the fall of the horse, but attributes the chest trouble to the sabre-belt and hard riding.]

Case 7.—Private Peter McGowan, Co. H, 6th U. S. Inf.; age 39; entered Dec. 18, 1862. At Antietam, September 17, he received a shell contusion on the left side, since which time he has had repeated hæmoptysis. On Feb. 9, 1863, while scrubbing the floor he threw up almost half a gill of dark blood. At this time the lower part of the left side was sensitive on percussion but not dull, and respiration was everywhere pure. On the 10th the hæmoptysis recurred, but he has been free from it since then. Meanwhile he has had several attacks of gastric pain, with furred tongue, anorexia, injected eyes and frequent pulse—such symptoms, indeed, as would be produced by a debauch, but he has been under observation and has not quitted the ward. [He was returned to duty March 23.]

Case 8.—Serg't William A. Carnaby, Co. I, 52d Ill.; age 25; was admitted Sept. 24, 1864, from furlough. He had been taken with an affection of the lungs in May, and began to spit up blood about June 1; he had also suffered from diarrhœa for twelve months. On admission there was some cough with emaciation and debility, but he had not expectorated blood for four weeks. Exertion caused shortness of breath and soreness in the right lung. He improved under cod-liver oil, stimulants and full diet, and was returned to duty December 7.—*Hospital, Quincy, Ill.*

Case 9.—Private Joseph H. Moss, Co. F, 103d Ill., was admitted Nov. 29, 1864, with hæmoptysis. He left his regiment on July 15, 1864, on account of pain in the breast, and has done no duty since that time. He complained of nothing else, but showed blood in the spittoon on several occasions. He seemed perfectly well and was put on duty in the kitchen, where he proved quite efficient. He was returned to duty Feb. 20, 1865.—*Hospital, Quincy, Ill.*

Harm to the soldier by the weight of the knapsack was in general effected during drills and parades at the recruiting and other stationary camps rather than in the field. When unusual exertions were anticipated in a proposed campaign knapsacks became of secondary importance. They were stored during the period of active service and returned to the men at its conclusion, or, if no official provision was made for their disposal, they were thrown away without concern as to their recovery. Veteran troops, as a rule, dispensed with their use. A change of underclothing was carried in the blanket, which was rolled into a cylinder and slung across the body from the shoulder to the opposite hip, where its free ends were tied together by a string. In fact, when the march or service became exhausting, the soldier's

impedimenta were carried at will. The harm accruing was the result of exertion under a given burden, and in no way pertained to an obligatory method of supporting it.

The figure on the right side of the plate facing page 870 shows the regulation position of the knapsack, blanket, canteen, haversack, cartridge-box and bayonet-scabbard on the person of the soldier when outfitted for service: the figure on the left, the arrangement of the straps and belts by which these articles were supported: the central figure, the veteran in light marching order, with his blanket disposed *en bandolier*.*

HERNIA.—The cartridge-box, resting on the loins and held in place by a belt fastened lightly around the waist, was the subject of a more extensive accusation than the various weights sustained by the shoulders and thorax of the soldier. Hernia, which caused 65.9 per thousand of the discharges for disability,† was occasioned or aggravated by exertion under the pressure of this waist-belt.

Medical Inspector E. P. VOLLUM, *U. S. A., Aug.* 21, 1862.—**Several cases of hernia had occurred in this regiment [1st Va.], caused, in the opinion of the surgeons, by the pressure of the belt on the abdomen in marching and other laborious efforts. This seems reasonable, as the weight of ammunition carried is now four pounds.**

Surgeon H. P. STRONG, *11th Wis., Sulphur Springs, Mo., Dec.* 31, 1861.—**I have had recently two cases of inguinal hernia, apparently caused by the weight of the cartridge-box upon the waist-belt.**

Brigade Surgeon THOMAS H. BACHE, U. S. V., *Ship Island, Miss., April*, 1862.—**Hernia is very common. I have noticed it frequently elsewhere than at this post. The primary cause may be a tendency to the disease, but I think the great weight of the cartridge-box, with forty rounds of Minié ball cartridges, the chief cause. The belts are buckled tightly, instead of hanging easily on the hip-bones. They hold by their tightness and diminish the diameter of the abdomen at the waist. When the men run and pant violently, each contraction of the diaphragm forces the intestines downward and imperceptibly enlarges the internal abdominal rings, making them ready to catch the gut.**

Surgeon ORPHEUS EVERTS, *20th Ind., Poolesville, Md., Oct. 24*, 1862.—**Rupture disabled a large number on the various marches. It was attributed to the heavy weight of ammunition upon their belts and to the handling of heavy logs in constructing temporary breastworks. From Fair Oaks to Harrison's Landing General Kearny ordered the men to carry one hundred and fifty rounds of ammunition. Some of them did so.**

Surgeon E. GRISWOLD, *112th Pa., Fort Saratoga, Washington, D. C., June* 5, 1862.—**The artillery drill is laborious and the infantry drill fatiguing. Several cases of hernia have been produced by heaving at the guns.**

Surgeon L. G. MEYER, *25th Ohio, Huttonsville, West Va., Jan.* 3, 1862.—**Carrying the logs by hand caused new cases of hernia, and aggravated and brought to my notice old ones not known to me before.**

Surgeon DAVID MERRITT, *55th Pa., Beaufort, S. C., May*, 1863.—**Hernia has been common during the past two years. The cause, in the opinion of the men, was the double-quick brigade drills instituted by General Viele: but as the men used the shoulder-straps and wore the belt loosely, the double-quick drill could hardly have been the prevalent cause. Some of those affected referred the accident to lifting heavy logs while at work on the stockade-fort at Hilton Head: others said they had been ruptured by falling. One, now a nurse in regimental hospital, became ruptured, according to his own statement, at the battle of Pocotaligo by jumping over a ditch. But we are inclined to believe that many were ruptured before they came into the service, and subsequently, finding the hardships of military duty to be disagreeable, presented themselves as ruptured and eligible for discharge. In regard to the examination of the recruits for this regiment, the writer is of opinion that many men were admitted to service whom he would certainly have rejected had he enjoyed the privilege of selecting the men whom he was afterwards to treat during their military career.**

Strangulation of the hernia was an uncommon occurrence, for of 24,353 cases of rupture

* A board of infantry officers, Nov. 24, 1874, recommended the adoption of a clothing-bag, which, with the haversack, was to be slung from a back-pad and shoulder-straps constituting a kind of yoke for their support. It was claimed that the back-pad gave additional bearing surface for the weight carried and that its shape enabled the shoulder-straps [illegible] connecting the front ends of the shoulder-straps secured a bearing on each. The braces adjusted themselves to fit any size or form of shoulders and enabled the load to be carried without compressing the waist or chest, bearing down on the hips or dragging the shoulders backward. The bags were to be worn on the posterior aspect of each side, well up under the arms. This, the *Palmer Brace System*, was approved and the new equipments were issued, but—"from Capt. Michaelis' report—it appears that in Indian campaigning the carrying-braces were regarded as a failure, and were therefore not used. He says: 'The men are always in light marching order and never under any circumstances use the carrying-brace.' And further: 'I saw two companies of the 14th Infantry, under the command of Lt. Col. Chambers, a member of the board which adopted the carrying-brace system, which had been supplied with the new packs, under circumstances which enabled them to [illegible] General Terry's column marched from Fort A. Lincoln I had fifty sets of the new equipments on hand for issue; I could not induce the infantry officers to [illegible] the mere sight of a man in harness, as they expressed it, was sufficient to condemn the system for field service [illegible] the back-straps which pass from the upper margin [illegible] the haversack, as [illegible] the old-style straps which pass from the lower margin [illegible] the haversack, as in practice during the civil war. But this practically, is not in use. Our soldiers in their Indian campaigns, as formerly during the marches and battles of the rebellion, sling their blankets *en bandolier* and do without a knapsack [illegible]

† *See supra*, page 27.

reported among the white troops during the five and one-sixth years, only 39 had a fatal termination. The records of two of these cases have been preserved:

CASE 1.—Serg't Lorenzo McBride, Co. A, 14th Veteran Reserves; age 35; was admitted at 10 P. M. March 8, 1865, with symptoms of strangulation of the bowels. Vomiting was frequent; the pulse quick and feeble; the countenance anxious and expressive of great suffering. He died thirty-six hours after admission. *Post-mortem* examination: The stomach and a large portion of the great omentum were found in the thoracic cavity, the protrusion having been effected through the œsophageal opening in the diaphragm,—[*Specimen* 522, Med. Sec., Army Medical Museum]. The protruded parts were gorged with blood.—*Act. Ass't Surgeon Isaac J. Moxley, Augur Hospital, Washington, D. C.*

CASE 2.—Private Jno. A. Robbins, Co. I, 143d Pa., was admitted Oct. 27, 1863, on account of functional disease of the heart. He wore a truss, but gave up its use in January, 1864, saying that his hernia no longer troubled him. He became intoxicated on the 11th, and late on the evening of the following day complained of the hernial tumor. He lay in bed with his knees drawn up, but had no special pain. The hernia was of moderate size but irreducible by the taxis under ether. A second effort was made to reduce before resorting to operative proceedings. On the morning of the 13th Dr. A. D. HALL opened the sac and found a mass of healthy omentum, a trifling effusion and about thirteen inches of unadherent intestine of a ruby color. While incising the internal ring on the tip of the finger the bowel became wounded by riding against the knife, and although the wound penetrated only to the muscular coat it bled so freely that a ligature was put on it before the intestine was returned. At one stage of the operation the ether produced alarming symptoms, the face becoming livid and the respiration gasping and almost ceasing. Ammonia to the nostrils, artificial respiration and galvanism to the cervical spine and præcordia were resorted to, and the patient rallied slowly. At 2 P. M. he was free from pain and quite comfortable, his countenance tranquil and pulse 112. An opiate was given to induce sleep. At 2 A. M. of the 14th he expressed himself to the nurse as feeling very easy, but half an hour afterwards was seized with a convulsion, labored respiration and coma, which ended in death at 5 A. M. *Post-mortem* examination: The membranes of the brain were much congested and the veins of the sulci engorged; the lateral ventricles contained yellow serum and the choroid plexus in each was congested. The right lung and the posterior part of the left lung were deeply congested. The pelvis was filled with bloody serum; the returned portion of the intestine was of a deep-red color, with patches of fresh lymph near its mesenteric attachment and adhesion of its coils; the ligature which had been placed on the wound of the intestine had come away and there was a recent clot on its surface; the omentum was inflamed and the peritoneum around the internal inguinal opening marked by deep ecchymoses.—*Hospital, 16th and Filbert streets, Philadelphia, Pa.*

In a third case the present writer operated but failed to save the patient:

While inspecting the field hospitals of the Second Army Corps at Burkesville, Va., April 16, 1865, he discovered a case of strangulated scrotal hernia which had been treated for several days by Epsom salt, croton oil, etc., as one of obstinate constipation by an inexperienced and careless ward physician. Chloroform was immediately administered and cautious efforts made at reduction by Surgeon CHARLES PAGE, U. S. A., Medical Director of the Corps, and others, but, these failing, the sac was laid open and the loop of intestine liberated and returned to its place. The patient died a few days afterwards of peritoneal inflammation.

LUMBAR PAINS, ETC.—Pains in the abdominal walls, in the loins and lower extremities, by some referred to rheumatism, were by others ascribed to congestion of the membranes of the spinal cord, induced, in part at least, by the weight of the cartridge-box.*

Ass't Surgeon DWIGHT M. LEE, *22d N. Y. Cav., Harper's Ferry, Va., Aug.* 31, 1862.—I wish to advert particularly to the injurious effect of the body-belt worn by many of our regiments. The weight of forty to eighty rounds of ammunition in addition to a heavy side-arm, supported entirely upon the hips and loins, is, I am confident, most pernicious. As we made no long marches I failed to trace any case of hernia to its agency, but there was constant complaint among the men of pain and weakness in the back, of soreness and tenderness in the bowels, and in some cases evidence of renal congestion. I was obliged to keep many men, otherwise fit for duty, on the sick-list, to avoid imposing on intestines already enfeebled and irritated, a pressure which I feared might provoke severe inflammation.

Ass't Surgeon LEE speaks of renal congestion in connection with the weight suspended from the cartridge-belt; but in none of the recorded cases of disease of the kidney is the attack referred to this as its cause. In fact, the only case of injury attributed to the belt, outside of those already mentioned, is the following:

Private George H. Tarbox, Co. E, 18th Conn.; age 25; was attacked with diarrhœa after a fatiguing march, June 30, 1864, near Gauley Bridge, Va. He remained with his company, and after ten days of exposure, fatigue and no treatment, reached Martinsburg, where the diarrhœa became complicated with pain and swelling in the upper part of the abdomen. These he attributed to his buckled belt, the weight he was carrying and the exhaustion of the march. He was admitted July 27: Tongue very red; pulse frequent; diarrhœa; extreme tenderness and swelling with fluctuation over abdomen; skin hot; countenance anxious. He was treated with small doses of blue-pill and Dover's powder, castor oil and afterward turpentine emulsion, opium and milk diet. On August 7 small doses of tincture of aconite were given, and next day balsam of copaiba and spirit of nitre. On the 10th the swelling was cir-

* See *supra*, page 833.

cumscribed and tender. Tincture of iodine was applied and Rochelle salt administered. Next day calomel, ipecacuanha and opium were given, and on the 15th the iodine was reapplied. He had a severe chill on the 18th, after which the fever subsided somewhat, the tenderness became lessened and the patient felt better and was able to walk about, but his tongue continued red and aphthous and his face and feet œdematous. Opiates were given at night and the iodine reapplied until the 28th, when he was seized with violent pain in the bowels and died next morning. No autopsy.—*Hospital, Cumberland, Md.*

III.—CONSTIPATION, HEADACHE AND NEURALGIA.

Constipation was the most frequent of the diseases of the digestive organs and headache of the diseases of the nervous system, with neuralgia following closely in order of frequency. There were reported among the white troops 145,960 cases of constipation, equivalent to an average annual rate of 65.5 cases per thousand of strength; 66,826 cases of headache, equalling an annual rate of 30, and 58,774 of neuralgia, equalling a rate of 26.4. Death in these cases was an accident explicable on the assumption of errors of diagnosis or the unrecorded supervention of some fatal disease. Twenty-three of the constipated patients died, one of the cephalalgic and eighteen of the neuralgic. Among the colored troops the cases of constipation numbered 17,204, or 93.8 annually per thousand men; of headache 14,732, or 80.3 annually, and of neuralgia 6,018, or 32.8 annually. Six deaths were reported under the heading of constipation, one under headache and five under neuralgia.

Constipation was relatively of more frequent occurrence during the earlier months of the war. This may be ascribed to the change in the food and habits of the men consequent on their enrolment for service. During the progress of the first winter, as the volunteer troops became accustomed to their new mode of life, the disordered condition became less frequent; but subsequently, with the occurrence of the warm weather of the second summer, the number of cases increased to its maximum. This increase was in part due to the advent of new troops and in part to a seasonal influence, which was distinctly manifested during the summer months of 1864, '65 and '66. In 1863 the seasonal influence was marked less by a defined accession in May, June and July than by a suspension of that decline in the rates which should have followed the gradual accommodation of the troops to their new manner of life. The rates of prevalence among the colored troops presented analogous characters—irregular and sudden elevations during the first year corresponding with accessions to the strength of the command, and seasonal variations giving a maximum in July and a minimum in the winter months.

An intimate correspondence may be observed by comparing the lines of prevalence of constipation with those of diarrhœa and dysentery. Dr. Woodward recognized that the summer rates of constipation were larger than those of the winter months, and that the monthly fluctuations in so far harmonized with those of diarrhœa and dysentery, this constituting in his view the only similarity in the curves of these functionally dissimilar affections. In reality, however, there is no notable variation in the curves of prevalence of diarrhœa and dysentery that is not found in those of constipation. Of course the variations in the latter disorder were small as compared with those of the more prevalent diarrhœas; but in both instances they preserved similar proportions to the totality of frequency. From this may be inferred a similarity in certain of the causative conditions. The increased prevalence of constipation in the summer may be attributed to the irregularity introduced into the personal habits of the men during this the season of active campaigning. Even the calls of nature were often deferred on the march or other toilsome service until a more convenient opportunity, which, when presented, not unfrequently found nature irresponsive.

Certainly many of the cases thus originating culminated in a subsequent diarrhœa, which was reported, although the preliminary condition of constipation remained unnoted.

To this intimate connection between constipation and diarrhœa may be referred the statistical differences which led Dr. WOODWARD to doubt the intimacy of the connection. He found that it was precisely where diarrhœa and dysentery were least frequent that constipation was most prevalent, the average annual rate of the latter being 132 in the region of the Pacific, 70 in the region of the Atlantic and 60 in the Central region, whereas the fluxes were least frequent in the Pacific and most common in the Central region.* But the failure of seasonal influences to sustain an argument based on the antagonistic quality of the regional influences should have suggested a closer investigation of the conditions attending these dissimilar results. Manifestly the high rate in the Pacific region becomes the subject of inquiry. This region was garrisoned by an average strength of about 10,000 men, or less than one-fortieth of the troops from which the medical statistics of the war were gathered. Moreover, this small proportion of the total force was exposed to few of the hardships and onerous duties to which their comrades on the eastern side of the continent were subjected. Their duties differed but little from those of the regular troops garrisoning the same stations in time of peace. Under these conditions there came up for report minor ailments which would have passed unnoted during the stirring events of an active campaign. Constipation became thus more frequently reported, although not of necessity more frequent in its occurrence, while diarrhœas were less prevalent, in part at least, *because* of the increased attention paid to the preliminary condition of constipation.

But while indicating the connection between torpidity of the bowels and diarrhœal conditions as of importance from the stand-points of the sanitary officer and the clinician, the many other causes of diarrhœa and dysentery so admirably discussed by Dr. WOODWARD are by no means undervalued.

HEADACHE.—Traced on the same diagram as the lines of constipation are those of headache among the white and the colored troops. The parallelism of these lines is striking, and suggests that the army might have been preserved from much of its sickness reported under the term headache had the causes of constipation been better known and more effectually shunned.

NEURALGIA.—The fluctuations in the prevalence of neuralgia were slight and irregular. The causes of this morbid condition appear to have been constantly in operation and with but little variation in their intensity. No influence of season or region was manifested; the affection was as common in winter as in summer,—in the Army of the Potomac as in the Department of North Carolina. The want of connection between the occurrence of cases reported under the title neuralgia and the passage of the great autumnal wave of the malarial diseases has already been mentioned.† In fact, neuralgia seems to have been due to conditions in which the individual rather than his surroundings constituted the prime factor.

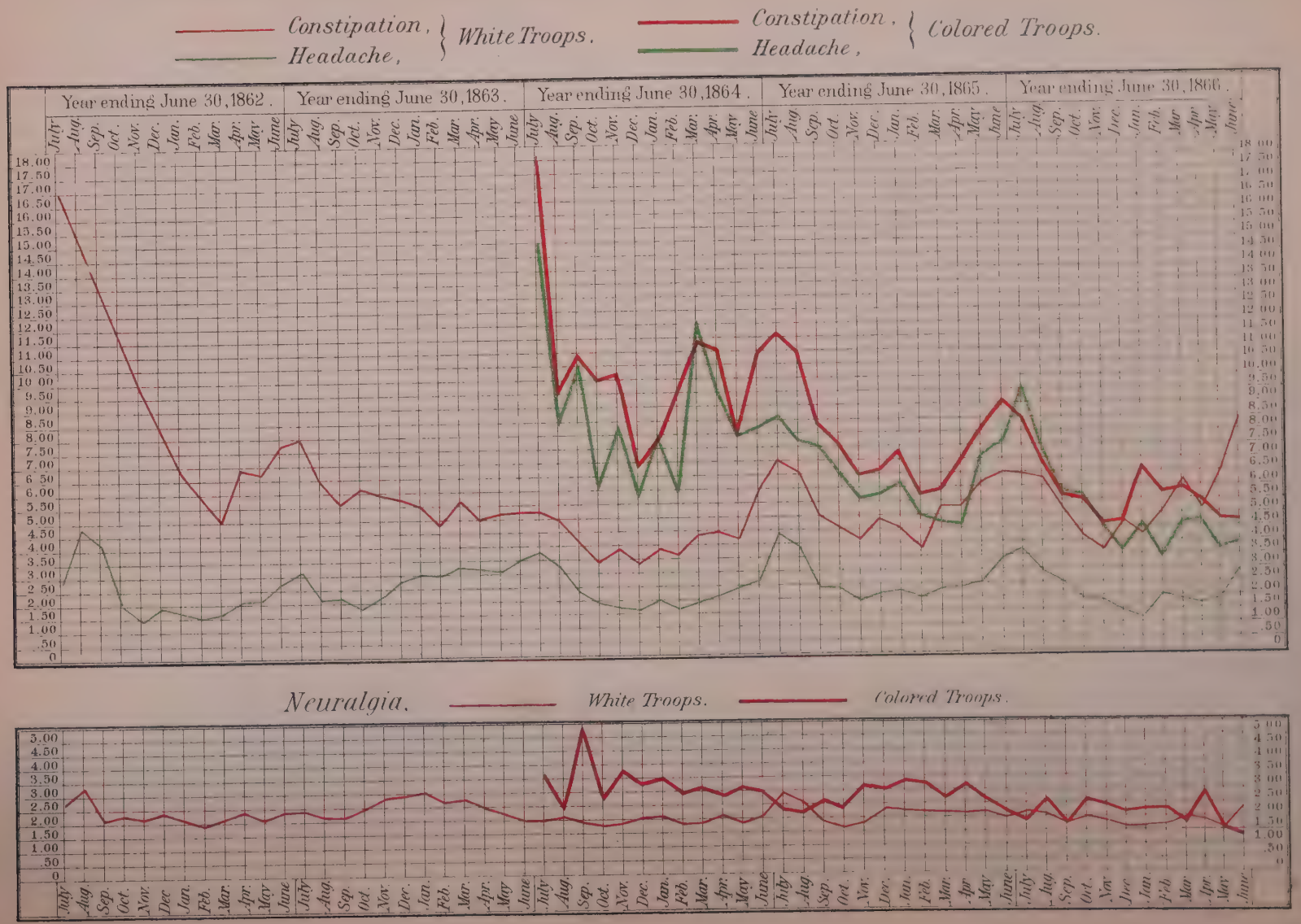
IV.—JAUNDICE.

Jaundice occurred frequently in the progress of the malarial and other fevers as the result of morbid changes affecting the liver or the blood. The yellow coloration in these cases was mostly an incident or symptom of the well-defined primary disease. There were, however, a large number of hepatic or haematic disorders in which the alteration of color con-

* See Second Medical Volume, p. 632.

† See *supra*, page 82.

Diagrams showing the Monthly Rates of Prevalence of Constipation, Headache and Neuralgia among the White and the Colored Troops per Thousand of Strength.



stituted so prominent a symptom that the disease was recorded under the heading of jaundice. No less than 71,691 cases of this kind were reported among the white troops. Generally the cases were sporadic, but sometimes a series occurred in a command constituting a local epidemic, which was frequently associated with an outbreak of continued fever, sometimes preceding the appearance of the fever and sometimes following its subsidence. Forty-seven cases were noted in the report of the 27th Conn. for the quarter ending March 31, 1863. Concerning these the regimental case-book has the following remarks:

The disease was characterized as follows: Usually some little excitement of the pulse; headache; backache; nausea and frequent vomiting; as a rule costiveness, though at times diarrhœa, preceded or succeeded the invasion; pain, apt to be of some duration, in the lumbar region and in the epigastrium—generally the right hypochondrium was also tender, but the principal distress was in the epigastric region; in one or two cases the left side of the chest was complained of; in perhaps one-eighth of the cases the right side of the thorax and shoulder seemed to be the seat of pain; at times the tenderness extended across from one hypochondriac region to the other. The nausea increased to vomiting, which generally ceased, when not modified by treatment, during the first week. Constipation, when present, was apt to persist during the continuance of the attack, excepting when obviated by cathartics. The appetite was from the first almost absent, and its return was the most reliable sign of convalescence. The stools, when uninfluenced by cathartics, were light in color and deficient in bile. The urine was dark but not scanty; at times it caused a little irritation in its passage. The pain in the lumbar region seemed referrible in many cases to the kidneys; it generally subsided when the urine became clearer. The eyes in some assumed a yellowish-green and muddy appearance. Convalescence was often imperfect,—in one case, after the patient had become strong enough to go on duty, typhoid fever supervened and proved fatal. Headache was often quite severe in the first stages of the disease, and was aggravated by the constipated condition. Debility was manifested early, and in some cases confined the patient to bed. After the first three days the pulse generally dropped to the ordinary rate, and in marked cases fell even as low as 45, this condition remaining to the end of the sickness. The skin showed the yellow-green tint. Emaciation was proportioned to the loss of appetite and gastric derangement; food usually caused great distress until rejected by vomiting. The tongue in some cases became brown, dry and even glazed or cracked. No case of the disease terminated fatally.

Treatment consisted at first of small doses of blue-pill; but this seemed to be inefficient or injurious, at times increasing the epigastric heaviness and pain. A scruple each of calomel and ipecacuanha, given in one dose as early as possible in the attack, acting thoroughly upward and downward, allayed the nausea and vomiting for the next forty-eight hours and often permanently. Although the patients usually complained of the emetic action, they were almost invariably changed for the better; the headache ceased or was much mitigated, the lumbar pain became easier, the skin moister, the pulse slower; in fact the change was evident and decided. Jalap or rhubarb, with ipecacuanha and capsicum, were ordinarily resorted to when constipation recurred; if these failed to act, as they occasionally did, sulphate of magnesia proved all-powerful. During convalescence quinine, iron and serpentaria were used with light food. In one case of extreme depression—pulse 45 to 50, tongue dry and brown, afterwards glazed, mind somewhat confused and face dusky—a five-grain dose of quinine in half an ounce of whiskey was given three times a day for several days. The disease supervened in one instance upon an attack of dysentery. In several cases the yellow color of the eyes, epigastric and lumbar pain, etc., have been singularly mixed with fever of a remittent or typhoid character, the jaundice subsiding after the use of an emetic and purge and the fever going on.

A few other extracts are herewith submitted:

Surgeon R. W. HAZLETT, *2d W. Va., Mount Summit, Md., April* 1, 1862.—We report sixty-four cases of jaundice as having occurred during the past three months, a number sufficient to justify us in calling it an epidemic. The cases were mild and readily yielded to treatment.

Surgeon HARVEY E. BROWN, *70th N. Y., Camp Farnum, Md., March* 31, 1862.—During the past month many cases of icterus have been reported. Nearly all were slight; few were so sick as to require excuse from duty. The disease yielded readily to treatment. A mercurial purge was followed by a teaspoonful of fluid extract of buchu every hour: when there was restlessness, morphia was given at night. This seldom failed to remove the jaundice in from two to four days. When it failed, small doses of calomel, opium and ipecacuanha were given with good effect. It was unquestionably miasmatic in its origin.

Surgeon T. HILDRETH, *3d Me., White's Ford, Md., Oct.* 25, 1862.—On Sept. 7, 1861, the regiment was encamped near Alexandria, Va., on high, well-drained ground. The tents were comfortable, the camp well policed, and the rations sufficient in quantity and of good quality; nevertheless we had a large number sick with fever, diarrhœa and jaundice. About one hundred cases had well-marked symptoms of icterus. The men were nearly all homesick, which apparently predisposed them to be attacked, as those not homesick and consequently more cheerful were generally exempt from the disease. The insanitary causes were believed to consist of change of climate, exposure and homesickness. Many dated their disease from exposures at the battle of Bull Run.

Ass't Surgeon W. W. GRANGER, *3d Mo. Cav., Rolla, Mo., Nov.* 2, 1861.—Of icterus there were nine cases, seven of which yielded readily to light alterative treatment in connection with proper regulation of the bowels and tonic bitters or infusion of wild-cherry bark. Mercurials in the beginning and iodide of potassium in the later stages were the alteratives used. One of the two remaining cases was complicated with remittent, the other with intermittent fever. Quinine in liberal doses formed the treatment of these until they were subdued.

Surgeon W. H. GRIMES, *13th Kansas, Springfield, Mo., Feb.* 2, 1863.—Under the head of diseases of the digestive organs are reported quite a number of cases of jaundice. I feel satisfied that these do not include half the cases that occurred. Indeed, from its frequent appearance among both officers and men, the disease resembled an epidemic. A few cases appeared after the battle of Cave Hill, November 28, as well among some rebel prisoners as among our own men, but the greatest number occurred after the fight at Prairie Grove. Whether the predisposing causes of this disease were to be found in the condition of the atmosphere, the habits of the soldiers, or were to be sought for in the emotions of the mind, is uncertain. The cases were mild and easily controlled, none fatal. They were treated with blue mass, sulphate of magnesia and decoction of wild-cherry bark.

In the absence of records bearing on the subject it is impossible to define the pathology of these cases of jaundice. Many were probably due to the temporary occlusion of the bile-duct by gastro-duodenal inflammation; others, particularly those with epidemic relations, to an action of the malarial influence similar to that which in its intensity gives rise to the hæmaturic variety of malarial fever; and others again to various organic changes in the glandular structure. The following are submitted as illustrations:

CASE 1.—Private Aaron Clements, Co. H, 1st N. Y. Cav.; age 27; was admitted Sept. 3, 1864, in feeble condition, pale and emaciated, his health having been much impaired by fasting, fatigue and diarrhœa during Hunter's raid to Lynchburg, Va. On October 1 he became jaundiced, but had no fever and but little pain. He died on the 7th. *Post-mortem* examination: The mucous membrane of the stomach was inflamed in patches near the pylorus. The duodenum contained a large quantity of muco-purulent matter; its mucous membrane and that of the jejunum were thickened and pale and their rugæ almost obliterated. The gall-bladder was about half full of dark-colored bile, but there was none in the intestine. The liver, ileum and colon were healthy.—*Cumberland Hospital, Md.*

CASE 2.—Private William Hanks, Co. E, 13th East Tenn. Cav., was admitted Feb. 6, 1864. The surface of the body was deeply jaundiced and there was some tenderness over the hepatic region; he had also acute diarrhœa. The pulmonic difficulty, which was no doubt the immediate cause of death, was not well characterized by symptoms during life, there having been neither cough nor dyspnœa. *Post-mortem* examination: Body moderately emaciated. The membranes of the brain were of a greenish-yellow color. The right lung weighed thirty-three ounces, its lower lobe being hepatized; the left lung eleven ounces; the pleural cavities were greenish-yellow in color. The pericardium was distended with three ounces and a half of serum; the heart was enlarged, soft and flabby. The peritoneum was of a pale-yellow color. The stomach was coated internally with greenish slime; the small intestine distended with flatus; the large intestine thickened in its lower portion but not ulcerated. The liver, seventy-seven ounces, was soft, friable and greenish-yellow in color; the gall-ducts were free from obstruction and the gall-bladder contained bile of a deeper color and greater specific gravity than usual; the spleen was soft and weighed eleven ounces; the kidneys also were soft and weighed thirteen ounces; the bladder contained two ounces of dark-colored urine. The solid viscera were tinged with bile-pigment.—*Act. Ass't Surgeon J. E. Marsh, Hospital No.* 19, *Nashville, Tenn.*

CASE 3.—Private George C. Booz, Co. G, 119th Pa.; admitted May 16, 1865, with jaundice. Died 29th. *Post-mortem* examination: The right lung was firmly adherent posteriorly and its upper lobe hepatized. Both ventricles of the heart contained olive-yellow clots. The liver was one-fourth of the usual size; the gall-bladder was normal and contained one ounce of bile. The spleen, stomach and intestines were normal; the bladder was distended with yellow urine.—*Depot Field Hospital, Sixth Army Corps, Army of the Potomac.*

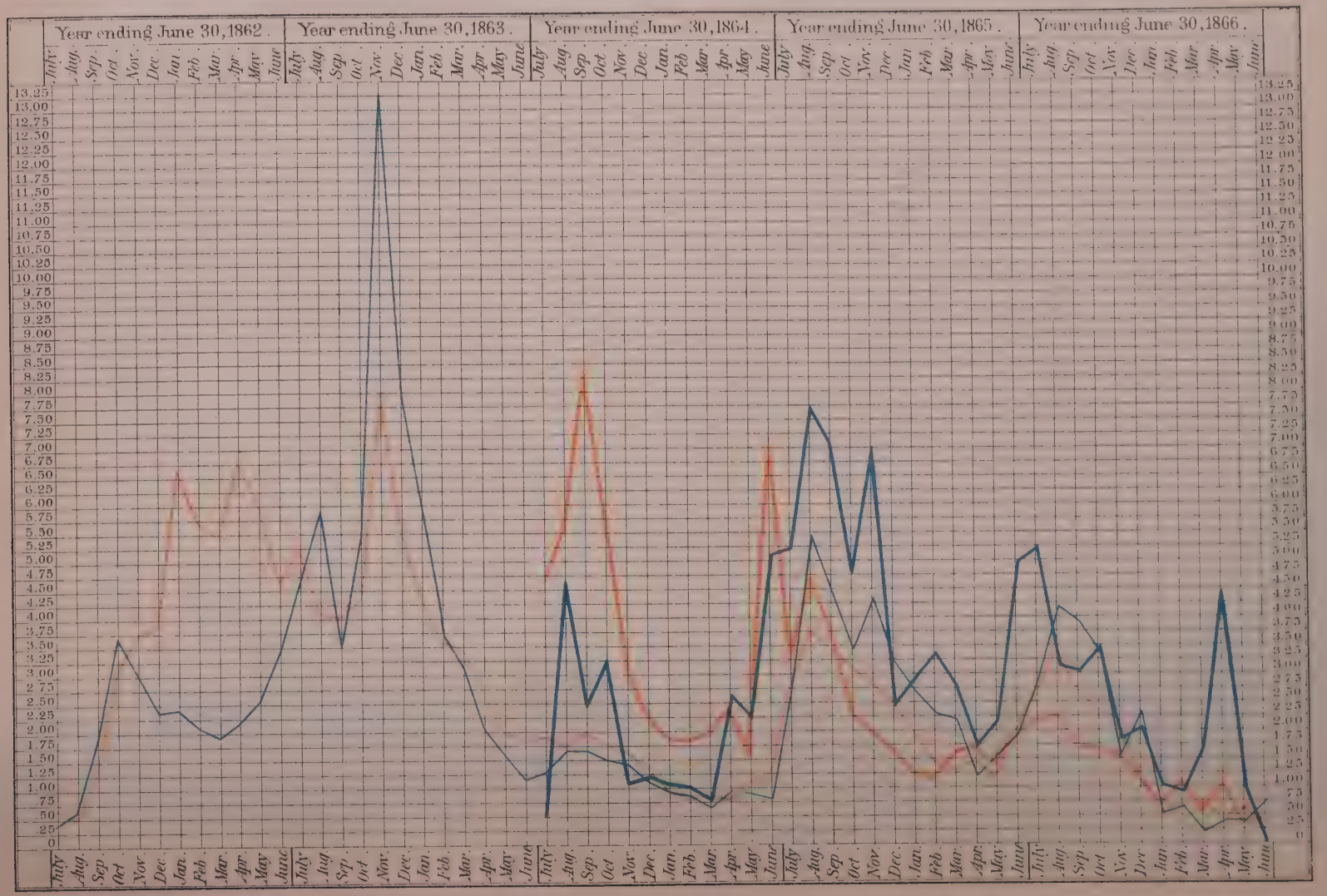
The monthly rates of prevalence of jaundice were exceedingly irregular during the first year of the war, the period of aggregation of the troops, but the special causative influence is as unknown, so far as shown by the records, as the pathological conditions. The high rate in the Atlantic region in November, 1862, was due to an unusual prevalence of the causes of the morbid condition in the Middle Department and in that of Washington, which gave 32 and 24, respectively, as the rates for the month, while the Army of the Potomac gave 11, the Department of Virginia 7, of the South 5, of North Carolina 4 and of the East 3 per thousand men. After this the disease became comparatively infrequent, but manifested a tendency to recur in the autumnal months. A similar seasonal increase was observed among the colored troops.

It was well recognized that jaundice was of more frequent occurrence in malarious than in non-malarious localities, although this is by no means demonstrated by a comparison of the statistics of the two diseases. A careful survey of the ratios of prevalence in the various departments fails to manifest a correspondence between jaundice and the malarial influence. Thus, during the year ending June 30, 1863, the Army of the Potomac, the Department of

Diagram showing Variations in the Monthly Prevalence of Salivation among the White and the Colored Troops in the Atlantic and the Central Regions.

White Troops. / *Colored Troops.* } *Atlantic Region.*

White Troops. / *Colored Troops.* } *Central Region.*



West Virginia, the Middle Department and the Department of Washington, none of which had an average annual rate of malarial fever exceeding 400 per thousand of strength,* reported respectively 53, 55, 71 and 92 cases of jaundice in every 1,000 men, while the malarious Department of North Carolina returned only a rate of 45. The probable explanation of this lies in the fact that the jaundice of notably malarious localities was so frequently associated with well-defined malarial disease that few cases remained for entry under the symptomatic heading.

Nor do the statistics show any close relation between jaundice and inflammatory conditions of the liver. The annual rate per thousand of strength during the five years ending June 30, 1866, were, in the order of their occurrence, for jaundice 39, 52, 14, 30 and 26, and for inflammation of the liver 12, 13, 6, 7 and 6. It is probable that when jaundice was recognized as associated with hepatic disease it ceased to appear on the records as jaundice.

The frequency of liver complications in diarrhœa and dysentery, malarial and other fevers, has already been noted; but besides these there occurred among the white troops 11,120 cases which were recorded as ACUTE INFLAMMATION OF THE LIVER. Most of the 243 fatal cases probably terminated in suppuration. A few of these have been preserved:

CASE 1.—**Private Jacob S. Bisson, Co. H, 1st U. S. Veterans; age 45; was admitted Nov. 2, 1865, having been seized two weeks before admission with chills, which recurred on two successive days and were preceded by languor** and loss of appetite. He was anxious and prostrated: his voice faltered: his tongue was dry and slightly brown, but **its tip and edges were red; his pulse was 84 and weak and his respiration 34 per minute; his bowels were tympanitic** and constipated, and there was great tenderness in the right iliac fossa: he had a stitch in his right side, with an **exaggerated vesicular murmur in the upper portion of the right chest and a distinct gurgling of liquid, coincident** with expiration, in the lower portion. Acetate of ammonia and Dover's powder were prescribed, with whiskey and beef-tea, a blister to the side and an enema of soapsuds. Diarrhœa, thin and slimy in character, occurred on the 4th: he complained also of cough, with slightly blood-stained expectoration, and of some gastric pain. Warm fomentations were applied and pills of lead and opium prescribed. At 7 P. M. the patient had a rattling in his throat from accumulated mucus which he was unable to bring up. He died shortly after 8 P. M. *Post-mortem* examination: **The lungs were small and dark from deposited pigment; they contained no tubercular matter; the lower lobe of the right lung adhered so firmly to the diaphragm that the latter was ruptured in the effort to detach it. The bronchial glands were filled with dark pigment. The heart and pericardium were normal. The liver was so greatly enlarged that the diaphragm was pushed up to the third rib; an abscess containing forty ounces of thick flaky pus was found in its right lobe,—[*Specimen* 669, Med. Sec., Army Medical Museum]. The spleen was small and soft; the suprarenal capsules normal; the kidneys slightly congested. The intestines were inflamed in several places and Peyer's glands enlarged, but there was no ulceration.—*Medical Cadet Harry C. Morrison, Hospital, Fort McHenry, Md.***

CASE 2.—Private William H. Andrews, Co. H, 65th N. Y.: age 41: was admitted from Annapolis, Md., Oct. 13, 1864, with phthisis and dysentery. He died November 28. *Post-mortem* examination: Body extremely emaciated. The lungs were somewhat congested but contained no tubercle; there were some calcareous concretions around the **root of the right lung. The lower lobe of this lung was fused to the diaphragm and liver and formed the upper wall of an abscess which extended into the liver and occupied the whole of the upper part of its right lobe: the interior of the abscess, which was irregular and ragged, was filled with unhealthy pus. The surface of the liver was covered with small abscesses, some of which contained healthy pus. The gall-bladder was occluded by a gall-stone about the size of a hickory nut. The mesenteric glands contained tubercular matter. The spleen was rather hard and congested. The other organs were normal.—*Act. Ass't Surgeon B. B. Miles, Jarvis Hospital, Baltimore, Md.***

CASE 3.—Private Benjamin Burns, Co. E, 13th West Va.: age 32: was admitted April 4, 1865, having been suffering for about four weeks from pain in the right inframammary region and a troublesome cough: he was much emaciated: his pulse quick and weak, tongue moist and bowels constipated. He became jaundiced on the 15th, had a severe chill on the 25th and a second on the following day, lasting about twelve hours. He died on the 28th. *Post-mortem* examination: Surface jaundiced. One-third of the lower lobe of the right lung was hepatized and adherent: **the remainder of the right lung, the left lung and heart were normal. The right lobe of the liver adhered to the diaphragm and was hollowed out into a large abscess containing two quarts of pus; the remainder of the liver was highly congested, enlarged and softened. The spleen was enlarged and congested; the colon much contracted; the kidneys enlarged, softened and infiltrated with pus. The peritoneal cavity contained thirty-two ounces of liquid.—*Cumberland Hospital, Md.***

CASE 4.—**Private Louis Ritt, Co. K, 178th N. Y.; age 50; admitted Nov. 25, 1865. This man had been four years in the United States, more than two of which were spent in the service, but he had formerly been a resident of Rio Janeiro: his habits were intemperate. He was very weak and anæmic, yellowish and waxy in appearance, with pale**

*See *supra*, Table XXXIII, page 98.

gums, flabby, dry and harsh skin, and swollen, pendulous abdomen. He had a frequent, short and dry cough. Tenderness in the hepatic region was increased by cough, deep breathing, digital pressure and lying on the right side. Hepatic dulness extended upwards to the mamma, but not much in a downward direction. There was no anasarca, but the patient complained of general abdominal fulness in addition to a sense of weight in the liver: he had anorexia, great thirst, gaseous eructations and constipation, his bowels on admission having been unmoved for eight days. A mercurial purge produced two very copious feculent brown stools, after which he felt easier, having less thirst, pain and distention, but a sharp pain continued to accompany a full inspiration or cough. Quinia, in two-grain doses, was ordered three times a day for two days, with nourishing diet, such as oyster-soup, eggs and beef-steak. Half an ounce of castor oil on the 27th produced several greenish stools of a penetrating odor, and on the following day the patient was able to lie on the right side, the pain and cough having decreased considerably. At this time the abdomen, though less hard, continued distended, and although there was no thirst the appetite was poor and the mind depressed. Citrate of iron and quinine was prescribed, with castor oil or Seidlitz powder every second day, and milk-punch, sherry wine, ale or porter as desired. Hiccough became troublesome about December 2, and his sleep was light and insufficient. During the next ten days he lost strength and became unable to get up without help. On the 12th he complained several times of feeling chilly; his cheeks and eyelids were œdematous and his tongue dry. He had lost all appetite and was very somnolent. From the right hypochondrium a large tumor could be seen extending downwards an inch below the level of the navel; it was tender, rather soft, knobby and not distinctly limited; the integuments over it were œdematous. The urine was free from albumen; the stools consisted of small clay-colored lumps, mixed sometimes with a little blood and a few drops of puriform liquid. Next day, the 13th, the tumor extended into the hypogastrium and was the seat of a dull aching pain. Death occurred on the 14th. *Post-mortem* examination two hours after death: Body congested in the dependent parts and offensive in odor; integuments of abdomen œdematous and fatty; extremities emaciated. Two gallons of pus mixed with blood were removed from the peritoneal cavity; the opposed peritoneal surfaces were adherent, and the mesentery, intestines and omentum interadherent by layers of organized lymph. The liver adhered in part to the diaphragm, but when these adhesions were broken down a large sac containing pus was discovered between them, by which the diaphragm was elevated as high as the nipple. The left lobe was enlarged, rather soft and yellowish; its cut surface, which greased the blade of the knife, was of a yellowish color, with numerous dark points of blood oozing from the divided vessels. The right lobe, which was soft and friable, was coated with dark-colored exudations. Towards the right edge of this lobe was an unopened orange-shaped abscess, four and three-eighths inches in diameter, filled with thick pus. A second abscess, separated from the first by a thin partition, communicated with the peritoneal cavity by an opening the size of a half-dollar, near the middle of the convex surface; the cavity of this abscess measured four and five-eighths by five and three-quarters inches, and was lined with a thick pyogenic membrane; it contained pus similar in character to that found in the abdominal cavity. The suppurative destruction affected at least three-fourths of the substance of the right lobe of the liver,—[*Specimen* 742, Med. Sec., Army Medical Museum]. The spleen was smaller than usual and shrunken; its coat was wrinkled and its edges somewhat indented.—*Surgeon Samuel Kneeland, U. S. Vols., Hospital, Mobile, Ala.*

Case 5.—Major John Leo, 185th N. Y.; age 33; was admitted Nov. 18, 1864, with what was at first called remittent fever. The stomach was extremely irritable; the liver slightly enlarged but not tender. On the fifth day after admission a swelling appeared over the left lobe of the liver; it was not painful and it subsided next day, when large quantities of an offensive green liquid were vomited and copious stools were passed of slimy, bloody matter with purulent admixture. At no time during the progress of the case was there any soreness in the abdomen. Gastric irritability continued to the last, a teaspoonful of beef-essence sufficing to induce vomiting. Death occurred on December 3. *Post-mortem* examination: The right lung was adherent, but otherwise the thoracic organs were healthy. The stomach was filled with a green liquid similar to that vomited during life. The right lobe of the liver was slightly enlarged but its tissues appeared healthy; the left lobe was natural in size and color but strongly adherent to the transverse colon, stomach and omentum. An abscess-cavity, walled in by these adhesions, was found on the under side of the liver near the transverse fissure; it communicated with the colon by two apertures,—[*Specimen* 453, Med. Sec., Army Medical Museum]. The omentum was red and thickened; the intestines contained viscid pus.—*Surgeon W. L. Faxon, 32d Mass., Depot Hospital, 5th Army Corps.*

Case 6.—William Lewis; civilian; colored; age 28; was admitted May 19, 1864, with pneumonia. On August 13, when the record first shows his condition, he was suffering from ascites, which caused a sense of fulness in the abdomen but gave no pain; he had also some œdema of the feet and legs. His appetite was good, but he was unable to walk much, though he occasionally went out for air. Diuretics were tried for several days, but failed to give relief. Mercurials seemed for a time to do good, but the benefit was not permanent and the patient gradually failed. He was seized on October 4 with intense abdominal pain, which by midnight became excruciating. In the absence of a trochar an incision large enough to introduce a female catheter was made just below the umbilicus, and twenty pints of liquid were drawn off with temporary relief to the patient. He died early next morning. *Post-mortem* examination: The liver was much enlarged, grayish-yellow in color, and contained several small abscesses filled with thin yellow liquid; the spleen was large and soft and presented in its upper portion a cavity filled with pus. The mesenteric glands were enlarged.—*Act. Ass't Surgeon W. K. Fletcher, L'Ouverture Hospital, Alexandria, Va.*

Case 7.—Corp'l Gideon McCall, Co. C, 31st Colored Troops; age 36; was admitted Aug. 9, 1864, with gunshot wounds of the left hand, side and hip. The patient was a mulatto of good character and steady habits. Shortly after his enlistment, in January, 1864, he was attacked with a diarrhœa of dark-colored stools, which continued with occasional intermissions until the date of his admission for gunshot injury. His wounds healed kindly and his

bowels, although sometimes loose, were easily controlled. About September 20 the intestinal discharges became frequent and thin and seemed to contain decomposed blood; but under treatment he improved rapidly and appeared to be in a fair way to recovery. This favorable condition lasted only three or four days. Troublesome hiccough supervened and the patient began to sink into a typhoid condition. He died October 8. *Post-mortem* examination: The liver contained thirteen large abscesses,—[*Specimen* 447, Med. Sec., Army Medical Museum]. The large and small intestines were examined with care, but no ulceration was discovered nor was there any evidence that bony tissue was involved in the gunshot injury.—*Surgeon E. Bentley, U. S. Vols, L'Ouverture Hospital, Alexandria, Va.*

Case 8.—Musician Joseph Price, 14th U. S. Inf.; age 16; was admitted April 3, 1864. While in Washington, awaiting transportation to his regiment in Virginia, he was much exposed to the weather, having to sleep in the snow. He was sick when he joined his regiment, March 24, having quotidian chills, colliquative diarrhœa, insomnia, great thirst and extreme tenderness of the chest and abdomen. On admission effervescing draughts, quinine, turpentine emulsion, with morphia at night and turpentine stupes, were prescribed. Eggnog was added to the treatment on the 5th, and on the following day, as the diarrhœa persisted, an enema of one grain of nitrate of silver in one ounce of mucilage was administered. On the 7th his mind became partially disturbed, and soon afterwards the discharges were passed involuntarily. He died on the 11th. *Post-mortem* examination: The pericardium contained eight ounces of straw-colored liquid. The lungs were healthy excepting a slight pleurisy on the right side. The diaphragm adhered at all points to the upper surface of the liver, which was very large and heavy and filled with numerous abscesses,—[*Specimen* 295, Med. Sec., Army Medical Museum]. The cavity of the abdomen was greatly distended with liquid, but the stomach, intestines, spleen, pancreas, kidneys and bladder were healthy.—*Ass't Surgeon E. DeW. Breneman, U. S. A., Hospital, 1st Division, 5th Army Corps.*

V.—IDIOPATHIC PERITONITIS.

In previous chapters of this work peritonitis has been found associated with malarial and typhoid fevers either as a result of the systemic poisoning or of the extension of inflammatory processes from the mucous membrane of the intestine or the solid abdominal viscera.* Peritoneal inflammation occurred also in the progress of tubercular disease,† and was a frequent and fatal complication of diarrhœa and dysentery.‡ But in some instances it was regarded as an idiopathic disease: 1,294 such cases, 530 of which proved fatal, were reported among the white troops. Idiopathic peritonitis must, however, have been a rare affection, for on examining the recorded cases of death from peritoneal inflammation hat remain to be submitted it is found that perforation from dysenteric or other ulcers, injury to a hernial protrusion or the probable presence of malarial or typhoid fever, accounts in certain instances for the invasion of the peritoneum by the diseased action; in a few cases only the record fails to demonstrate the causation of the peritoneal inflammation.

Case 1.—Private Randolph Gideon, Co. C, 2d Tenn.; age 35; a paroled prisoner; was admitted May 2, 1863, having been taken sick while *en route* from Richmond, Va., to his home. He had severe and persistent vomiting, ejecting a watery fluid mixed with bile and portions of undigested food. He was more or less comatose from the first, but sometimes answered questions rationally. There was no epigastric or hepatic tenderness, and no evidence of pain except on the 12th, when he complained of his right hip. His tongue was dry, thirst excessive, urine copious and passed involuntarily, and his bowels, although constipated, were readily moved by enemata. Oxalate of cerium, creasote, bismuth, morphia and chloroform with counter-irritants were employed, without success, to check the vomiting. Only raw eggs and small quantities of milk were retained. Nourishing enemata were frequently administered. He died on the 14th. *Post-mortem* examination: Body moderately emaciated. The brain was not examined. The thoracic viscera were healthy. The liver was rather larger than normal, but healthy. The stomach was normal in size and contained some watery fluid; its mucous membrane was reddened and its pyloric orifice contracted. At the commencement of the duodenum there was a firm well-marked constriction, reducing its calibre to less than half an inch in diameter. Around this portion of the intestine were deposits of coagulable lymph, and immediately below, on the posterior aspect of the gut, was a perforation with thickened and introverted edges. The gall-bladder was distended. The kidneys were normal.—*Ass't Surgeon Charles B. White, U. S. A., Pittsburgh Hospital, Pa.*

Case 2.—Private John H. Colbert, Co. H, 32d Wis.; age 31; admitted May 15, 1865, exceedingly exhausted from the continuance of a violent diarrhœa with bloody stools. Died 23d. *Post-mortem* examination: There was a large perforation in the duodenum through which the intestinal contents had escaped. The whole of the canal was much inflamed and its mucous membrane eroded.—*Third Division Hospital, Alexandria, Va.*

Case 3.—Charles Smith, teamster, was admitted Aug. 8, 1863. His health had been good until early on the day preceding his admission, when he had been seized with pain in the stomach and bowels, but not of so severe a character as to prevent his engaging in his usual occupations. Towards noon the pain became greater and he was compelled to stop work. He took a dose of sulphate of magnesia, which produced a free watery evacuation and gave

* See *supra*, pages 134, 277, 425 and 450. † See *supra*, page 827. ‡ Part II, pp. 314, 388, 455, 497 and 546.

considerable relief, but during the night he again became worse. On admission the abdomen was much distended and tender. He died on the 16th. *Post-mortem* examination: The abdominal cavity contained a large quantity of purulent matter and coagulated lymph. The lower part of the large intestine was almost gangrenous.—*Union Hospital, Memphis, Tenn.*

Case 4.—Private Kelso Bicking, Co. E, 175th Pa.; admitted July 6, 1863. Peritonitis. Died 11th. *Post-mortem* examination: Body not emaciated; thighs, shoulders and back purple. The peritoneal cavity contained a quantity of serum mixed with pus and lymph. The mesentery was much thickened and congested, and the coils of the intestine were glued together and to contiguous organs by thick lymph: on breaking up the adhesions several large perforations were found. All the coats of the intestines were disorganized and in a putrid condition.—*Act. Ass't Surgeon Lloyd Dorsey, Harewood Hospital, Washington, D. C.*

Case 5.—Private S. T. Morse, Co. B, 38th Wis.; admitted July 24, 1864, with chronic diarrhœa. Died September 4. *Post-mortem* examination: Body much emaciated. The lungs were bound down by old adhesions. The abdominal cavity contained twelve pints of bloody purulent serum. The intestines were coated with greenish-yellow lymph and glued together so that they could not be separated without rupture. The liver had a similar coating; the gall-bladder was distended; the spleen was soft and measured seven inches by four and a half; the kidneys and suprarenal capsules were healthy.—*Act. Ass't Surgeon J. H. Price, Fairfax Seminary Hospital, Va.*

Case 6.—Private William H. Simons, Co. H, 88th Pa.; age 17; was admitted July 20, 1864, with an inguinal hernia on the right side. He was on duty as a nurse until Jan. 14, 1865, when he had a slight chill with pain in the head and loins, lassitude, anorexia, a moist, yellow, furred tongue, dry and hot skin and slightly quickened pulse; his bowels were regular and there was no abdominal tenderness. On the 19th nausea and restlessness were developed, and the abdomen became tympanitic and tender on the right side. Vomiting followed next day, and delirium and death on the 22d. *Post-mortem* examination: The right ventricle of the heart was dilated, the left contracted. There was some stasis of blood in the upper lobes of the lungs, lobular pneumonia in the lower lobes and recent adhesions on the right side. The abdominal viscera were interadherent by yellow lymph. The liver was yellow and granular; the spleen soft; the ileum distended with air, injected of a rosy hue and presenting, at about eight inches from the ileocæcal valve, a loop with adherent sides and slightly darkened surface. The internal abdominal ring was open and the hernial sac empty and uninflamed.—*Lincoln Hospital, Washington, D. C.*

Case 7.—First Lieut. Moses H. Luber, Independent Company, 20th Pa. Cav., was admitted moribund Oct. 3, 1863, and died in two hours. He had suffered from excruciating pain in the right iliac region, with tenderness but no tympanites of the abdomen. *Post-mortem* examination: The vermiform appendix was ulcerated and perforated and the peritoneum inflamed; the ileocæcal valve was extensively ulcerated.—*Officers' Hospital, Philadelphia, Pa.*

Case 8.—Private Frank Wade, Co. F, 2d Ill. Cav.; age 17; was admitted May 8, 1865, in an emaciated condition from a continuance of fever and diarrhœa. Under the influence of quinia, turpentine, Dover's powder and diffusible stimulants, he improved until the 25th, when he suffered a relapse, and died June 4. *Post-mortem* examination: The lower lobes of the lungs were congested. The large and small intestines were inflamed and adhered together and to the walls of the abdomen by bands of fibrin.—*Slough Hospital, Alexandria, Va.*

Case 9.—Abel W. Roberts, Co. E, 8th Miss.; admitted Dec. 17, 1864. Typho-malarial fever. Died 20th. *Post-mortem* examination: Body jaundiced but not emaciated. The lungs were healthy although the pleura was slightly inflamed. The pericardium contained four ounces of dark-yellow serum. The liver was engorged. There was peritonitis with slight effusion in the abdominal cavity; the omentum was thickened and adherent to the intestines.—*Act. Ass't Surgeon J. M. Witherwax, Hospital, Rock Island, Ill.*

Case 10.—Private Samuel Davidson, Co. E, 62d Pa.; admitted June 9, 1862. Died July 8, at 4.10 o'clock, apparently without pain. The case, as indicated by the attending physician, J. M. Da Costa, was one of cirrhosis in a person who probably had been intemperate,—enlarged spleen from malarial influence, pleuro-pneumonia and finally acute peritonitis. *Post-mortem* examination: The brain was not examined. The heart was natural in size and structure. The left lung was healthy except that it contained a few small tubercles about the size of hemp seed, scattered through the parenchyma near the surface, especially in the upper lobe; the pulmonary pleura also presented a few small patches, from one-eighth to one-half inch in diameter, of grayish translucent pseudomembrane; the corresponding costal and phrenic pleuræ were healthy. The right pleural cavity was distended with a coffee-colored serous liquid; the lung was collapsed and reduced to a mass little larger than the fist, dark-purplish in color and on section spongy and comparatively dry, but containing no air; its three lobes were compactly joined, the original separation being seen in section as thick opaque white lines; the pulmonary pleura was thickened, white and covered with yellowish translucent pseudomembrane, which also adhered to the phrenic and pericardiac pleuræ; the corresponding costal pleura was white, opaque and somewhat thickened but not covered with pseudomembrane. The abdomen was distended with several gallons of a coffee-colored serous liquid. The peritoneum was everywhere covered with pseudomembrane of recent formation and nearly uniform thickness,—that investing the abdominal parietes and the great omentum was rather translucent yellow with vascular spots, while that on the intestines was brownish-red with spots of yellow. Excepting the liver, stomach and spleen, the viscera were not agglutinated. The pseudomembrane, which readily stripped from its attachments, was between the sixth and the fourth of a line in thickness. Detached, it appeared yellowish with vascular spots. In structure it consisted of a fibro-granular stratum containing a multitude of granular corpuscles about the size of pus-corpuscles. Yellow spots on the membrane consisted of accumulations (purulent foci) of similar corpuscles. The liver was moderately enlarged, brownish-yellow, decidedly granular—(in an early stage of cirrhosis). The gall-bladder, twice the ordinary bulk, was distended with bile containing an abundant granular intermixture. The spleen was much enlarged, eight inches long, six broad and three and a half thick; its

section presented a bright current-jelly color and ordinary consistence, with a denser structure of lighter color penetrating irregularly from a line to an inch and a half from the surface into the interior. The stomach was contracted and empty, its mucous membrane healthy. The small intestine was contracted; the mucous membrane, including the agminated and solitary glands, healthy. The pancreas was of the usual size and color, but remarkably hard and crisp. The suprarenal bodies were natural; the kidneys smaller than usual, but healthy.—*Act. Ass't Surgeon J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

CASE 11.—Louis Weder, Co. I, 1st N. Y. Cav., was admitted March 28, 1864, having been affected for six weeks with synovitis of the right knee, the cause of which was unknown. Tincture of iodine was applied daily. On April 3 he had a violent headache, with pain in the back and bowels, some vomiting and diarrhœa, complete anorexia, and jaundiced eyes and skin. Camphor and opium pills were given, with hop fomentations to the abdomen. Next day drowsiness and fever were added to the symptoms; the pain in the abdomen was aggravated, the pulse small and frequent. During the night of the 4th he had fourteen stools and vomited a greenish liquid once or twice. At 5 A. M. of the 5th the pulse was 140, very small, weak and soft, respiration 42, expression anxious. The pain in the abdomen continued; the vomiting, temporarily checked by creasote and morphine, recurred at times with increasing prostration until death occurred, on the morning of the 6th. *Post-mortem* examination: Body not emaciated; skin tawny; conjunctivæ yellow; mouth and nostrils giving issue to a yellow liquid. The knee-joint contained about two ounces of synovia and a few flakes of lymph; the membrane lining the cartilages of the patella and femur was roughened; the subserous areolar tissue on the ligamentum patellæ and other soft parts of the joint was exceedingly vascular. The abdomen was distended with several quarts of serum and lymph,—there was a large quantity of lymph in the pelvis and also above the liver, and the intestines were glued together, but no perforation or other indication of the origin of the peritonitis was discovered. The stomach and intestines were distended with liquid. The liver was fatty; part of the right and left lobes was hob-nailed, showing on section a surface mottled with red, yellow and gray, and knotty to the touch. Heart and lungs healthy.—*Ass't Surgeon J. H. Bartholf, U. S. Vols., Hospital, Frederick, Md.*

CASE 12.—Private L. D. Lockwood, Co. G, 22d N. Y. Cav.; age 17; admitted April 28, 1864. Died May 6. *Post-mortem* examination: Brain, lungs and heart healthy. The stomach was much congested at its cardiac extremity. The intestines were anæmic. The peritoneum contained a half-pint of creamy pus. The liver was soft and flabby; the spleen anæmic; the kidneys flabby, their pyramids congested.—*Lincoln Hospital, Washington, D. C.*

CASE 13.—Private Louis Roberts, Co. A, 32d Ala.; age 24; admitted Oct. 29, 1864. Debility and diarrhœa. Died 31st. He was insensible when admitted. *Post-mortem* examination: The pericardium contained six ounces of clear serum; the surface of the heart was corrugated and its substance softened; the right ventricle filled with a white clot, which extended along the pulmonary artery until its divisions were no larger than a pin. The omentum was enlarged and the abdominal viscera adhered to each other and to the diaphragm. The liver was much softened; the gall-bladder contracted to about a quarter of an inch in diameter.—*Rock Island Hospital, Ill.*

CASE 14.—Private John A. Smith, Co. K, 6th N. J.; age 17; was admitted July 13, 1863, with a gunshot wound of the fingers of the right hand. On July 17 the middle finger, with the head of the corresponding metacarpal bone, was amputated, and by September 3 the wound had nearly healed; but the patient appeared feeble and nervous. On November 24 he complained of headache; his skin was hot and dry and his bowels constipated. Blue-pill was given, followed by Epsom salt. On the 27th he had sore throat, to which nitrate of silver was applied. He vomited twice on the 29th and exhibited great nervous excitement. Small doses of sulphate of morphia were given. Next day he had continual vomiting, epigastric pain and tenderness, great pallor, hot and dry skin, rapid and almost thread-like pulse, dry and coated tongue. He died on the 31st. *Post-mortem* examination: The pleura covering the lower lobe of the left lung was acutely inflamed. The lungs and heart were normal. The peritoneal cavity contained two and a half quarts of seropurulent liquid. The large and small intestines were of a bright-red color and agglutinated by fibrinous deposits; the parietal peritoneum also was much inflamed. The liver was somewhat enlarged and engorged with bile; the spleen was three times the normal size; the stomach and kidneys normal.—*Act. Ass't Surgeon R. M. Girrin, Satterlee Hospital, Philadelphia, Pa.*

CASE 15.—Corp'l John Angermeier, Co. D, 99th, Pa., admitted Sept. 14, 1862, with debility. Peritoneal inflammation supervened, and he died December 1. *Post-mortem* examination: The peritoneum, visceral and parietal, was inflamed and thickened by exudation.—*Third Division Hospital, Alexandria, Va.*

CASE 16.—Private James Robinson, Co. G, 126th Ohio, was admitted during the night of Sept. 5, 1863, in a state of collapse from idiopathic peritonitis. Death occurred next morning. *Post-mortem* examination: The intestines were covered on their serous surface with a layer of recent lymph; the peritoneal cavity contained half a pint of serum.—*Act. Ass't Surgeon S. Smith, Central Park Hospital, New York City.*

VI.—DISEASES OF THE KIDNEYS.

It is evident from the records that these diseases were infrequent during the war. Death from lesions of the urinary and genital organs appears from Table IV* to have been as frequent among the male population of the military age in the United States as among the troops, and somewhat more frequent among our regular soldiers since the war than

* *Supra*, page 16.

among the volunteer troops of the war period. The kidneys were often implicated in the congested and inflammatory conditions consequent on specific febrile invasion, but idiopathic disease was unusual. Most of the reported cases were aggregated under the heading *Inflammation of the Kidneys:* 154 deaths occurred in a total of 9,464 cases among the white troops, but neither the clinical nor the *post-mortem* characters of these cases were recorded. The few instances of fatal organic disease found in the Case-books and Medical Descriptive Lists are such as might have appeared in the wards of a civil hospital. Exposure to cold and the other hardships of a campaign are suggested as the determining causes in some of these cases, but neither the weight of the cartridge-box nor the pressure of the belt is arraigned in connection with them.

CASE 1.—Private John E. Wood, Co. I, 10th N. Y. Heavy Art'y; age 21; was admitted Dec. 24, 1864, with marked œdema of the legs and some puffiness of the face, especially about the eyes, which had appeared four weeks before his admission, after exposure to cold by lying on the damp ground. The swelling began on the day following the exposure and gradually increased. He had a cough and a syphilitic eruption on the skin; his urine was albuminous. He was treated with diuretics, diaphoretics, iron and other tonics. On Feb. 4, 1865, Rochelle salt, in a daily dose of one ounce, was prescribed. On the 11th he was much worse, being somewhat comatose, the pulse frequent and feeble, the urine scanty and dark-colored, showing under the microscope red-blood corpuscles and many cysts filled with oil-globules. Tincture of digitalis in ten-drop doses was given every three hours. On the 13th the pulse was stronger and the mind clear, but the anasarca had become general and there was considerable ascites. Bromine was ordered on the 18th for a bed-sore which had appeared. The stools became involuntary on the 22d and the breathing difficult on the 26th. He died March 1. *Post-mortem* examination: All the tissues were infiltrated with serum; the abdominal cavity contained sixteen pints. The right kidney weighed ten ounces, the left eleven ounces. [*Specimen* 530, Med. Sec., Army Medical Museum. When received at the museum the kidneys were of a tawny-yellow color, mottled on the surface; the epithelium of the tubuli contained large numbers of oil-drops, and the connective tissue of the matrix many new elements.]—*Act. Ass't Surgeon D. L. Haight, Douglas Hospital, Washington, D. C.*

CASE 2.—Private John E. Colter, Co. C, 59th Ga.; age 47; was admitted April 22, 1865, with general dropsy. The patient said that he had been in good health to within a few weeks, and ascribed his dropsy to exposure, cold and other hardships of the campaign. Cathartics and diuretics were prescribed. He died two days after admission, rather suddenly and without premonition, while eating his dinner. *Post-mortem* examination: On opening the thorax an enormous quantity of watery serum escaped. The lungs were pale, dry and emphysematous. The pericardium was filled with water; the heart was considerably hypertrophied but there was no valvular disease. The liver was much enlarged and harder than usual; the gall-bladder large and filled with deep-greenish, almost dark, bile; the spleen double its normal size and highly congested. The kidneys were inflamed and altered in structure. The stomach and intestines appeared healthy.—*Act. Ass't Surgeon A. Kessler, West's Buildings Hospital, Baltimore, Md.*

CASE 3.—Private John Shirly, Co. K, 29th Colored Troops, became affected with œdema and ascites in August, 1865. Died November 9. *Post-mortem* examination: The right lung was congested and œdematous, and the pleural sac contained a quart of slightly discolored serum; the left lung was normal. The aortic valves were thin and permitted regurgitation. The peritoneal cavity contained three quarts of clear serum. The liver was enlarged and somewhat fatty. The kidneys were small, fatty, and so soft that they broke easily under pressure; there was no distinction between the cortical and pyramidal structures.—*Act. Ass't Surgeon H. Raphael, Post Hospital, Brownsville, Texas.*

CASE 4.—Private George Rice, Co. E, 15th N. Y. Cav.; age 50; intemperate; was admitted November 21, 1864, with anasarca, the thorax, abdomen, face, hands and lower extremities being involved; he had a hard, dry, hacking cough and urgent dyspnœa; his bowels were constipated. He was treated by a diuretic mixture of squill, buchu, copaiba and spirit of nitre, with an occasional dose of Epsom salt, cream of tartar and jalap; the action of the latter on the bowels was always followed by marked but temporary relief to the dyspnœa. His strength gradually failed, and he died Jan. 3, 1865. A few days before death he expectorated some blood-clots. *Post-mortem* examination: The pleural sacs contained three pints of liquid. The lungs were mottled gray and bluish-black by venous congestion; from the anterior surface of the middle lobe of the right lung projected a tumor, which on section showed coagulated blood ramifying into the adjacent bronchial tube. The heart was normal. The stomach was congested and thickened, its rugæ obliterated. The liver was cirrhosed and the gall-bladder distended with bile. The right kidney was lobulated and had a hydatid tumor the size of a filbert imbedded in its lower extremity; its cortex was almost obliterated and its pelvis loaded with fat which extended by many diverging lines to the surface. The right kidney was soft and friable and presented some fatty deposits in its pelvis.—*Cumberland Hospital, Md.*

CASE 5.—Edward P. Matthers; age 24; assistant druggist on board hospital transport, died July 31, 1862. *Post-mortem* examination: The apices of both lungs were partially attached by old adhesions; that of the right lung exhibited a contracted and condensed portion of pulmonary tissue, apparently the cicatrix of an old ulceration. The heart was slightly hypertrophied and the mitral valve atheromatous. The abdomen contained several gallons of serous liquid. The liver was cream-colored, enlarged and fatty. The kidneys were affected with fatty degeneration which involved the whole of the cortical substance.—*Act. Ass't Surgeon J. Leidy, Satterlee Hospital, Philadelphia, Pa.*

Case 6.—Private William H. Williams, Co. D, 140th Pa., was admitted Nov. 30, 1864, with lumbar pains and gastric irritability. He was much emaciated; pulse full and intermittent, 144. He was treated with anodynes, astringents, tonics, stimulants, and concentrated food by the mouth and rectum, but without improvement. Died December 18. *Post-mortem* examination: Pleuræ adherent on both sides; lungs œdematous, in part collapsed; pericardium containing four ounces of straw-colored serum; auricles of heart hypertrophied; aortic valves thickened by ossific deposits; liver disorganized, fatty; spleen healthy; peritoneum containing eighteen ounces of straw-colored serum; intestines congested and inflamed but not ulcerated; left kidney enlarged, weighing sixteen ounces, granular; right kidney in similar condition but not so large; bladder containing six ounces of pale albuminous urine.—*Third Division Hospital, Alexandria, Va.*

Case 7.—Private Benjamin Miller, Co. K, 30th Colored Troops; age 20; admitted Dec. 7, 1864, with dropsy. Died Jan. 22, 1865. This man did light duty for some time about the wards, but on January 1 the œdema of the lower extremities began to increase, and in a few days the swelling had become general; he had also several chills, each followed by fever. *Post-mortem* examination: The abdominal cavity was filled with serum and the kidneys were large, fatty and granular.—*Act. Ass't Surgeon W. Bishop, L'Ouverture Hospital, Alexandria, Va.*

Case 8.—Private Alfred Stewart, substitute; age 27; admitted Oct. 21, 1864. Died 31st, from uræmia. *Post-mortem* examination: The pia mater was slightly congested; the brain healthy. The viscera were normal except that the lungs showed some old adhesions, and the kidneys were small, dark-colored externally and congested internally, the left presenting also an abscess the size of a walnut.—*Second Division Hospital, Alexandria, Va.*

Case 9.—Private Daniel Wood, 5th Me. Batt'y; age 31; was admitted Aug. 27, 1864, having had albuminuria for about a month. His appetite was good; his feet and legs were œdematous, and he had pain in the præcordia and loins, with some headache and dyspnœa; pulse 90; respiration 32; urine albuminous, acid, passed frequently and in large quantity,—as, for instance, on the 29th, five and a half pints in seven hours. He was furloughed on the 30th and returned September 22 in bad condition: Tongue red at the tip and edges, dark and dry in the centre; much thirst; no appetite; he had slept none for two nights while on his journey. The anasarca had become general, causing cough and so much dyspnœa that he had to be propped up in bed to sleep; there was also some mental hebetude. He had a dull pain in the loins and had passed but little urine during the previous week,—acid, dark-colored, sp. gr. 1011, highly albuminous and rich in tube-casts and blood-corpuscles. Dry cups were applied to the back and a mixture containing digitalis, calumba, opium, spirit of nitre and camphor was given three times daily, with Dover's powder at night. Two days later it became needful to puncture the scrotum. On the 28th coma and convulsions supervened, whereupon cream of tartar was substituted for the mixture. With a somewhat increased discharge of urine the tendency to coma became less marked, but dyspnœa continued, necessitating the sitting posture night and day and causing great exhaustion and incoherent muttering. Coma recurred on December 20; pulse 64, weak and fluttering; breathing laborious; extremities cold; face clammy; urine scanty; stools involuntary and associated with prolapse. The stomach became extremely irritable at this time and continued so until death, on the 31st. *Post-mortem* examination: Trunk and upper extremities much emaciated; legs and scrotum œdematous. The brain was healthy; its ventricles free from effusion. The pleural cavities were nearly filled with serum; the lungs compressed but otherwise normal. The heart, pale and flabby, contained no clots. A large quantity of liquid was found in the peritoneal cavity. The liver was firm, pale and waxy; the spleen small and firm; the pancreas normal. The kidneys were enlarged,—the left weighed ten ounces and was waxy, its cortex pale and its medulla dark-colored; the right weighed ten ounces and a half. The stomach and small intestine were normal; the colon thickened and softened; the rectum congested, thickened and softened.—*Hospital, Annapolis Junction, Md.*

Case 10.—Ashley R. Jackett, Co. K, 5th Mich. Cav., was admitted June 26, 1863. No history could be obtained previous to the occurrence of the anasarca, which appeared shortly before his admission. The urine, high-colored, acrid and albuminous, contained tubular casts, renal epithelium, an abundance of fat-globules, a few blood-disks and crystals of uric acid. Treatment consisted of cups over the loins, warm fomentations and diaphoretics; later the hot-bath was used, with acetate and bitartrate of potash, the latter of which afforded some relief. The feet were scarified. The diet was nutritious, fats being avoided. Erysipelas set in July 23. Death on August 3 was preceded by coma. *Post-mortem* examination: Body much emaciated; hydrothorax, ascites and general anasarca present. The heart weighed eleven ounces and a half. The lungs were healthy. The kidneys weighed eight ounces and each presented the appearance of Bright's disease.—*Act. Ass't Surgeon Norman S. Barnes, First Division Hospital, Alexandria, Va.*

Case 11.—Corp'l George Montague, Co. K, 195th Ohio; age 29; was admitted Dec. 8, 1865, with acute rheumatism. He had been treated at regimental hospital for eight days and had been intoxicated for two weeks previous to the attack. On admission the left thigh, knee-joint, leg, ankle and foot were much swollen and very painful, and the left elbow and wrist tender and painful; the tongue was dry and dark-brown, the stomach irritable, the abdomen tympanitic, the stools frequent, light-colored and watery, the pulse 100 and weak, the skin dry and the mental faculties dull. Colchicum, morphine and effervescing draughts were prescribed. Next day, as the patient had passed no urine since admission, the catheter was employed, but only a tablespoonful of ropy liquid was obtained. Small and repeated doses of calomel, opium and ipecacuanha were prescribed, and subsequently dry cups to the loins, with buchu and spirit of nitre, and barley-water as a drink. No urine was passed, and the patient died comatose on the 11th. *Post-mortem* examination: Body not emaciated; complexion sallow. The brain was congested, and a small clot was found in the fissure of Sylvius, near the island of Reil. There were old adhesions on the posterior aspect and apex of the right lung: its middle lobe was in part hepatized and presented old cicatrices on its anterior surface. The heart was large but otherwise normal. The liver was fawn-colored and enlarged; the spleen very large and firm. The kidneys were large, fawn-colored and mottled on the surface with streaks and spots of congestion; the epithelium

of the tubuli was granular and contained free oil-drops,—[*Specimen* 766, Med. Sec., Army Medical Museum]. The bladder was empty and firmly contracted. The descending colon was contracted and contained several small blood-clots, but there was no ulceration.—*Surgeon E. Bentley, U. S. Vols., Slough Hospital, Alexandria, Va.*

Case 12.—Private John Tyler, Co. I, 1st Reg't Invalid Corps, on duty in the hospital kitchen, was taken suddenly with convulsions Jan. 11, 1864. He had no pain in the abdomen and had been complaining but little prior to this attack. He died next day. *Post-mortem* examination: The lungs were engorged with blood, which flowed freely upon section. The heart contained a large white clot. Two pints of pus were found in the peritoneal cavity. The liver was covered with lymph and softened but not granular; the spleen was macerated and softened, pale-blue externally and grayish-blue internally; the pancreas was healthy. The intestines were healthy except within three feet of the anus, where the mucous membrane was congested and covered with whitish tenacious mucus. The kidneys were purplish-red, large and flabby, the sections mottled and greatly congested; the suprarenal capsules were pale and friable but of natural size.—*Ass't Surgeon Harrison Allen, U. S. A., Lincoln Hospital, Washington, D. C.*

Case 13.—Private John Donnelly, Co. B, 1st Mass. Heavy Art'y, was admitted Nov. 22, 1865, with anasarca, increasing dyspnœa, drowsiness and convulsions occurring at hourly or half-hourly intervals, during which he passed small quantities of albuminous urine. Coma supervened, and he died next morning. *Post-mortem* examination: The pia mater was moderately injected, especially at the base of the brain; the sac of the arachnoid contained a small quantity of limpid serum; one spot of ecchymosis was found on the upper and back part of the right hemisphere; the corpora striata were speckled on their ventricular aspect with minute ecchymoses; the floor of the fourth ventricle showed lines of marked congestion and blood-spots. The lungs were œdematous, the right weighing thirty-four and the left thirty ounces. The spleen weighed sixteen ounces but was otherwise normal. Both kidneys had a pale cortex which tore readily in the direction of the tubules and was of low specific gravity; the right kidney contained a small cyst in its lower part. The fundus of the stomach was reddened. The mucous membrane of the large intestine was darkly discolored throughout.—*Ass't Surgeon Geo. M. McGill, U. S. A., National Hospital, Baltimore, Md.*

Case 14.—Private Louis Kail, Co. D, 119th N. Y., was admitted Oct. 15, 1863, with ascites and rheumatism. The joints were tender and the abdomen rotund, but the patient was able to walk about the hospital. Colchicum and sweet spirit of nitre, and afterwards jalap and cream of tartar, with iodine locally, were used. For a time there was some improvement, but on December 8 he became wildly delirious, requiring restraint by the straight-jacket. Active purgation by calomel and rhubarb, and afterwards by castor oil and croton oil, was employed. This induced prostration, and on the night of the 11th he slept for a few hours. When awake he talked constantly, laughing vacantly and using desperate oaths. On the 16th he kept blowing through his teeth as if to cast something from his mustache, alternating this with wild screams or muttering delirium; his pulse was almost imperceptible and his skin covered with cold perspiration. He died on the morning of the 18th. *Post-mortem* examination: The vertex and sulci of the cerebrum were bathed in sero-purulent matter and the ventricles filled with bloody serum. The lungs were healthy. The heart was fatty and somewhat dilated; the muscular walls were reduced to half their normal thickness. The liver was hypertrophied and indurated; a cyst the size of a buckshot and containing biliary matter was found on its surface. The calices and pelvis of the right kidney were filled with exuded fibrin and albumen—traces of which were also present in the left kidney.—*Act. Ass't Surgeon W. A. Gordon, Hospital, Louisville, Ky.*

CHAPTER XI.—ON CERTAIN DISEASES NOT HERETOFORE DISCUSSED.

I.—NOSTALGIA.

A temporary feeling of depression frequently pervaded our camps on account of discomfort, hardships and exposures, especially when these were recognized or assumed by our volunteer soldiers to be of a preventable or uncalled for nature. During its continuance the happiness and comforts of home arose to mind, coupled with the desire to again experience them. This natural result of existing discomfort constituted the only nostalgic influence to which our troops as a rule were subject. While it lasted it was dangerous to their efficiency; but even the rumor of an intended movement generally sufficed to ruffle the mental surface on which the home attractions were depicted, blur the outlines of these and arouse the men to their wonted activity and energies. Occasionally, owing to peculiarity of temperament or to domestic troubles or afflictions, the home feeling became developed to a morbid degree and was reported as *nostalgia*. This must therefore be regarded as a camp disease of the war period, although it cannot be said to have been of frequent occurrence, as only 5,213 cases were reported among the white troops, or 2.34 cases annually per thousand of strength. In

the second year of the war, when the average number of men in the field was nearly double that of the first year, the rate of prevalence rose to 3.3 per thousand. Epilepsy, indeed, so far as frequency is concerned, has more claim than nostalgia to be called a disease of our war camps, for 9,029 cases were reported, or 4 annually in every thousand of strength.

BARTHOLOW has given an excellent summary of the points connected with this morbid condition.* The primal cause was undoubtedly absence from home in new and strange surroundings, particularly when these were of a depressing character. The patients were derived from two classes of soldiers,—young men of feeble will, highly developed imaginative faculties and strong sexual desires, and married men for the first time absent from their families. The monotony of winter camps favored its evolution—active campaigning repressed it. Cases rarely occurred in regiments provided with mental and physical occupation. Intelligent officers prevented a morbid depression of spirits by directing the work of their men in channels leading to comfort and health, in improving the condition of their camps, giving variety to military exercises and instituting open-air sports and pastimes. In nostalgic cases some derangement of the health, as a rule, preceded the mental phenomena. Ass't Surgeon J. THEODORE CALHOUN, U. S. Army, generally found nostalgia associated with some other morbid condition,—as a cause still abiding or a result.† In either instance the complication was of a serious character, as the mental depression seemed to destroy the recuperative power. In the following case the nostalgic influence seems to have determined the fatal result:

Private Ezra Bingman, Co. G, 161st Ohio; age 30; was admitted May 18, 1864, convalescing from rheumatism, much depressed in spirits and exceedingly homesick. On July 7 his pulse was weak, cough slight, expectoration tough and stringy, skin dry and harsh, tongue white; hectic fever, dysphagia and much prostration were followed by hiccough, and death July 21. *Post-mortem* examination: The lungs were emphysematous anteriorly and much engorged with venous blood posteriorly. The heart was small and fatty; the liver enlarged, friable and fatty; the other organs were not examined.—*Cumberland Hospital, Md.*

References to nostalgia are infrequent in the reports of our medical officers:

Surgeon MADISON REESE, *118th Ill., March*, 1863.—During this month nostalgia affected a large number of the men, nor were they perhaps less free from it the previous month. The state of the weather, their uncomfortable situation, the vast amount of sickness throughout the whole army and the numerous deaths—all combined to depress their spirits. They were but lately from home and its comforts, and their present condition was in striking contrast to their former one. The men who were principally affected with this disease were those who were somewhat ailing but were able to go about. They had physical suffering, but not enough to keep their thoughts from dwelling on home. Men who were severely sick and suffering from bodily pain were generally but little affected with this trouble. In one case the disease amounted to mania.

Surgeon JOHN L. TAYLOR, *3d Mo. Cav.*—In civil life every man was necessarily engaged in some business that gave more or less employment—enough for the sanitary condition of the mind and body. Many had been habituated to physical labor, with only such exercise of the mind as was necessary to accomplish the work on hand. For them to acquire a more extended field of mental labor is impossible; their habits of thought are formed. It is therefore needless to try a system of book-study with them. They must be taught practically the obligations and duties that become necessary for them to learn. They must be taught the manual of arms by the force of practice. They must learn the science of tactics by repeated drill. Daily military exercise should be enforced. This combines physical exercise with the same amount of mental labor that has been their custom through life. The home-sick patient shows a want of resolution and activity in all his undertakings; he is serious, sad and timid, apprehending on the slightest grounds the most serious results—great personal danger, and even death itself. This condition is soon followed by emaciation, languor and listlessness.

How shall we treat these patients? To send them home would encourage others to indulge in the hope of getting away. They begin to contemplate a leave of absence. Their minds are then permitted to entertain the causes that have produced the disease in others, and they become, as it were, imperceptibly entrapped. To ward off this condition the soldier must act before the vital and nervous powers become depressed.

During the first twelve months of the organization of this regiment we had twenty-three home-sick patients, and in five of these there was some mental alienation, especially manifested by their insistance that a return to their homes was indispensable to the recovery of their health. In many instances the symptoms of hypochondriasis were present: Disordered digestion; increased sensibility; palpitations; illusions; a succession of morbid feelings which appeared to simulate the greater part of disease; panics; exaggerated uneasiness of various kinds, chiefly in what

* See page 21, *U. S. Sanitary Commission Memoirs*, New York, 1867.

† *Medical and Surgical Reporter*, XI, Philadelphia, 1864, p. 130.

regards the health, which they strenuously contended was seriously injured and could not be restored short of being at home. There was a stubborn indolence in these patients—an aversion to anything like even ordinary exercise. They were generally found lying in bed or sitting around the tents, making a great deal to do about their sufferings and the ills that were awaiting them. Kind and sympathizing words—amusements—seemed to invite a more deplorable condition. We became satisfied that an altogether different policy must be carried out. No ordinary means could arouse them from their mental and physical inactivity—they seemed to be callous to moral sensibility.

The patients were now required to exercise to the extent of their physical ability. This was enjoined as a duty. At the same time a system was inaugurated to impress them that their disease was a moral turpitude; that soldiers of courage, patriotism and sense should be superior to the influences that brought about their condition, and that to speak of home as inseparably connected with their recovery, and all that constituted happiness, was petty and degenerating. The purpose in view was made known to the nurses, and every opportunity was taken to inflame the feelings of their patients by impressing them with the idea that their disease was looked upon with contempt—that gonorrhœa and syphilis were not more detestable. This course excited resentment,—passions were aroused, a new life was instilled and the patients rapidly recovered. Within two years not a single case of nostalgia has occurred, which may be attributed to the fact that idleness is unknown in the regiment, while the odium attached to the disease has played a part in causing the men to overcome the influences which tend to its production.

In the absence of detailed reports on this subject by others, the writer feels warranted in submitting the results of his own experience.*

The fatigues of a march and the excitements of an active campaign stimulate the nervous energies to a high point. On the inauguration of a permanent camp, the labor necessary to secure shelter and comparative comfort fully occupies mind and body. But after a time, unless a healthy safety-valve be provided for the nervous force which has heretofore been expended in the superintendence of muscular action and in vital resistance to exposures, the soldier becomes fretted by the tameness of his camp-life. Tobacco is smoked during this period of listlessness and inactivity, nominally to pass the time, but in reality for its sedative influence on the unemployed nervous system, until the circulation becomes poisoned and loss of appetite, impaired digestion and prostration of nerve-power are the results—the last being manifested by languor, tremulousness, palpitations and obscure cardiac pains. If alcoholic liquors can be obtained they are much resorted to at these times, and excesses tell on the nervous system by depressent action. Vicious dealings with the generative functions have, in individual cases, furnished the temporary excitement and produced that subsequent collapse of the vital powers which has figured on the registers as "nostalgia." Gambling is the favorite excitement of many, and prolonged sessions are held in cramped positions and foul atmospheres, implying loss of sleep and disorder of assimilation.

Excitement is craved—something to do to pass the dull hours. Drills and parades are better than nothing, as furnishing occupation and exercise; but they are distasteful to the men as devoid of excitement and savoring of unnecessary work.

Company commanders should cater to the tendencies of the leading spirits of the command. There are always certain men who can carry the crowd with them, either into foot- and base-ball clubs and other outdoor sports or to minstrel troupes and semi-theatrical entertainments, which furnish amusement to all, either as actors or audience. These men should be encouraged as the most valuable for the time being in the camp. Horse-racing affords an interest to all; and target-practice—not the formal so many rounds per man of duty-firing—but competitive shooting by teams from the different regiments. Pedestrianism ought to be cultivated among infantry troops, and prize-matches arranged for favorable days.

In large commands men can be picked out with special talents as vocalists, prestigiators, gymnasts, etc., and these should be organized as an army company and encouraged by official recognition and assistance in catering for the amusement of the troops. Everything of this kind would be hailed with enthusiasm.

A camp kept well amused will be a healthy one—free at least from all nostalgic influences—and the object to be gained, as promotive of efficiency, is worthy of special effort. In large commands an officer should be detailed as Superintendent of Public Amusements, who should be manager of theatrical performances, races, competitive shooting and prize competitions of all sorts. If active and enterprising, he would save many from the sick-list and tide the command over the tedium of winter-quarters with undiminished nerve-force.

II.—ARMY ITCH.

During the period covered by the statistics there were reported among the white troops 32,080 cases of itch and 35,667 of skin disease; among the colored troops 3,156 of itch and 3,279 of skin disease. The average annual rates calculated from the sum of these numbers are 30 per thousand of strength among the white and 35 among the colored troops. The disease popularly termed *army itch* constituted an unknown proportion of these cases.

The reports on file in the Surgeon General's Office give no information concerning this disease. In the absence of official records personal testimony may be of interest:

* See Vol. XIX, *Ziemssen's Cyclopedia, American Ed.*, New York, 1879, p. 117.

The writer served in the field with the Second Army Corps, Army of the Potomac, from the autumn of 1862 until the disbandment, and had special facilities for observing the medical history of that command; yet he saw only an occasional case of scabies, and but few cases which, not being scabies, were of such a character as to warrant their designation by the popular title of that parasitic disease. Many men suffered from prickly heat, especially during their first summer in the south. In some cases the papules became torn and inflamed in efforts to allay the intolerable itching, and in others an eczematous condition was developed, due perhaps to some peculiarity of the constitutional state. Lichen was frequently aggravated by the unaccustomed contact of coarse-fibred clothing, and when, as was not unfrequently the case during an active campaign, a company or regiment became infested with the *pediculus corporis*, the combined sources of irritation produced a disease of the skin which sometimes incapacitated the soldier from service, associated as it was with great suffering, mental disquietude and loss of rest.

These constituted the only pruriginous conditions which, in the experience of the writer, prevailed among our soldiers in the field. Nevertheless, a number of articles appeared in the medical journals, after the close of the war, depicting army or camp itch as a contagious disease, epidemic among our troops, disseminated by them extensively among the civil population in the vicinity of their camps and lines of march, and conveyed to their homes in the north on their return to civil life. Some claimed the disease to be a new importation from southern territory; others insisted on its existence in the northern states prior to the outbreak of the rebellion. Some western practitioners recognized in it an old acquaintance known by the names of *prairie dig*, *western itch* or *Missouri mange*. Certain writers considered the disease in all cases to have been neither more nor less than scabies, and announced its amenability to the specific treatment for that affection. Others believed it to be allied to prurigo, differing, however, from that disease by the possession of infectious characters, or akin to scabies, but dependent on a parasite to which the exposed rather than the protected aspect of the limbs afforded a congenial settlement. It was claimed that the disease did not attack the commissures of the fingers or the flexures of the joints as in scabies, but the arms, chest, abdomen and lower extremities. Those who sustained its parasitic nature generally found sulphur washes or ointments efficient in its treatment; while those who considered it akin to prurigo as generally failed in curing their patients by means of sulphur.

According to the descriptions given the disease began as a lichen or prurigo with the development of papules which itched intolerably. Scratching caused the surface to be dotted with dark points of dried blood. Afterwards the affected parts assumed an eczematous or even an impetiginous character as the result of neglect and violence, and in certain stages of the disease a thin, yellowish, acrid liquid exuded from the inflamed parts.

It is interesting to note that those medical officers who had the best field of observation in the northern as in the southern armies distinguished between scabies and the disease to which they applied the name camp itch. S. J. Radcliffe of Washington, D. C., who had been on duty at Annapolis, Md., during the war, regarded the disease as vesicular, and contagious from the highly excoriating qualities of the exuded liquid; he discovered no parasite in the inflamed parts. Jno. H. Claiborne, who had been in charge of the Confederate hospitals at Petersburg, Va., found the disease registered by medical officers as itch or camp itch to have been rarely scabies, but an affection akin to lichen or prurigo, which sometimes became vesicular or pustular when aggravated by the many unpropitious influences to which the soldier on active service was exposed.

It would seem, therefore, that our medical officers confounded under the term army itch two series of cases—the one scabies, and the other a non-parasitic inflammation of the skin originating in a complexus of local irritant and unhealthy constitutional conditions. The former appears to have prevailed among the civil population and the troops in contact with them, the latter among the soldiers engaged on the actual theatre of war.

Scabies has no claim to the title of army itch. It was well known before the war in Maryland, Pennsylvania and many of the Southern and Western States. The troops became infected by contagion from civil life. Crowding in camp and want of facilities for personal cleanliness in some instances diffused the disease. The soldiers exposed to the torment of this civic infection suffered enough without having to bear the odium of its development. If the name of camp itch is to be retained by medical men it should be restricted to the non-parasitic cases of pruriginous skin diseases.

The following abstracts of papers on army itch are submitted:

GEORGE M. STERNBERG, Ass't Surgeon, U. S. Army,* declares the only difference between this disease and scabies as seen in civil practice to be one of degree. Soldiers neglect to apply for treatment until they are completely covered with the eruption, which is so lacerated by the patient's nails and masked by complications that it would be difficult to recognize the disease if the case were an isolated one. "It is not surprising," he says, "that the disease should cover a larger extent of the surface and appear on the outside of the limbs as well as in the flexures of the joints, when we consider the crowded manner in which soldiers live in their tents or barracks and the carelessness that exists among them in regard to personal cleanliness. The soldier catches the disease by sleeping with a comrade who is covered with the eruption or in blankets which are filled with acari and their ova, and the disease is at once started from many different centres. The little acarus squats upon a new recruit with every prospect of a long life and a large family, and burrows away, undisturbed by soap or sulphur, until every square barley-corn of the poor soldier's skin is like a New York tenement house,—full inside and out." During the winter of 1865–66 he had nearly two hundred cases among the recruits at Jefferson Barracks, Mo., and found no difficulty in effecting a speedy cure by means of a wash prepared by boiling an ounce each of sulphur and recently-slacked lime in two quarts of water until the liquid measured three pints. This was filtered for use.

W. S. FORWOOD, Darlington, Md.,† also considers army itch as scabies aggravated by long standing and neglect. He saw a large number of cases in 1864 and 1865, and as scabies prevailed in the same vicinity prior to the war he had ample opportunities for comparison. Sulphur ointment invariably cured the disease in his part of Maryland.

D. L. PHARES, Newtonia, Miss.,‡ observed the disease in all its stages and complications among all classes, conditions, ages and occupations, and claims to have demonstrated its cause, the acarus scabiei, in hundreds of cases. An ointment of two parts of sulphur, one of carbonate of potash and eight of lard, following the use of soft soap in the warm-bath, cured ninety-nine per cent. of all cases by a single thorough application. He notes that sulphur itself produces an eruption on the skin of many persons, and that he has seen practitioners keeping up by its use a cutaneous irritation little less distressing than the original disease, which they supposed they were still treating.

H. B. WILSON, Boonsboro', Md.,§ refers to the hundreds of thousands of troops from the north and south that traversed the county of Washington, Md., during the progress of the war, and to the consequent infliction of army itch on its inhabitants to a greater degree than in any other county in the United States. He assumes the disease to have been parasitic, but sulphur ointment, with sulphur and cream of tartar internally, failed to cure it. The infallible remedy in his hands consisted of an ointment of four ounces of sulphur, two drachms each of white precipitate and black sulphuret of mercury and twenty minims of creasote in ten ounces of lard.

J. E. JACKSON, Fallston, Pa.,‖ who was familiar with the disease before the war, conceives that it differs from the old, common or school itch only in a want of predilection for the roots of the fingers, the flexures of the joints and the finer parts of the skin, and in its failure to respond to the sulphur treatment, which is effective in scabies. He assumes the presence of a peculiar acarus, which requires for its destruction the free use of soap and warm water, and the subsequent application of an ointment consisting of two drachms each of white precipitate, nitrate of potash and iodide of sulphur, and half an ounce each of carbonate of potash and oil of bergamot in six ounces of lard.

B. F. RECORDS, Paradise, Mo.,¶ and J. J. TYREE, Waynesville, Mo.,** testify to the existence of the disease in their State prior to the war, when it was known under such names as *Illinois Itch*, *Missouri Mange*, *Prairie Dig* and *Bastard Itch*. The former was successful in treating it only when he had recourse to an ointment of two drachms of sulphur, one drachm of sulphate of copper, half a drachm each of red oxide of mercury and alcoholic extract of aconite in two ounces of lard. The latter objects to the name of army itch as conveying inaccurate views; refers to the thin yellowish liquid that exudes from the inflamed patches in certain stages of the disease, and states that although Fowler's solution internally and red oxide of mercury ointment externally constitute the best remedial agents, these sometimes require to be continued for many weeks before a cure is effected.

P. J. FARNSWORTH, Iowa,†† also recognized the disease as an old acquaintance known from the time of the earliest settlers by the name of *Western Itch*. He has always regarded it as an undescribed affection allied to prurigo. It is very contagious and is no doubt often associated with scabies; but it does not, like the latter, make its first appearance between the fingers, but on the body and limbs. It associates with nearly every other form of papular and vesicular disease; in some cases eczema results from it, and in other cases pustules. Sulphur ointment fails to cure the

* *Medical and Surgical Reporter*, XIV, Philadelphia, Pa., 1866, p. 298.
† *Medical and Surgical Reporter*, XIV, Philadelphia, Pa., 1866, p. 378.
‡ *Ibid.*, Vol. XVI, 1867, p. 524.
§ *Ibid.*, Vol. XIV, 1866, p. 136.
‖ *Ibid.*, XV, 1866, p. 104.
¶ *Ibid.*, XV, 1866, p. 105.
** *Ibid.*, p. 105.
†† *Ibid.*, XV, p. 106.

disease, but a lotion of sharp vinegar or of corrosive sublimate is effective. Fowler's solution may be required on account of complicating disorders.

W. E. WHITEHEAD, Ass't Surgeon, U. S. Army,* found the disease indigenous in the Southern States, and especially prevalent in Missouri, Arkansas and Tennessee. It is contagious, particularly among members of the same family or company, or where frequent and close contact takes place, as by the use of the same bed, blankets or articles of clothing. It chiefly affects the inner aspect of the thighs and forearms and the lower part of the abdomen. Soap and water with compound sulphur ointment or kerosene as local applications controlled the disease in from ten days to two weeks.

E. A. WOOD, McKeesport, Pa.,† was familiar with the disease in his section of the country before the war. He distinguishes it from prurigo by its contagious properties and from scabies by its attack on the outer or more exposed portions of the body and limbs. It is generally caught by sleeping with or wearing the clothes of an infected person. It runs through the varied progressions of erythema, lichen, eczema, impetigo and psoriasis, and may even be complicated with boils. Treatment by sulphur was effective in his practice. Like JACKSON of Pennsylvania, he assumes the presence of a parasite similar to, but distinct from, the acarus scabiei.

L. C. BUTLER, Essex, Vt.,‡ traced it invariably to importation from the south by our returned soldiers. It is highly contagious and is no respecter of persons. He says positively it is not scabies. It seldom, in his opinion never, in its inception is found in the groins, axilla, armpits or between the fingers, but instead appears on the arms, forearms, chest, abdomen or lower extremities, and in some rare cases upon the scalp. Sometimes it is a fine eruption, hardly discoloring the skin or raised above it; again it resembles rubeola and gives a sensation of roughness to the surface. The pruritus is sharp and stinging, causing incessant scratching, by which the papules are torn and a minute blackish crust formed on their apices, giving the eruption a characteristic appearance. Underneath this crust is a minute red point which fades as a new crop is developed. In many of its characteristics, exclusive of contagion, it resembles prurigo. It has no vesicle nor pustule, yet sometimes, from the incessant irritation, there is formed a discharging surface which may be covered with scabs. He refers the disease to an infection in the blood, which requires constitutional as well as local remedies. Uniform success attended perseverance in the use of a mixture of four to eight grains of arsenite of soda in four fluid ounces of compound syrup of sarsaparilla in doses of a teaspoonful morning and evening, with the occasional exhibition of fluid extract of iris versicolor, leptandrin, pipsissewa or podophyllin, as may be required, and the external application of an ointment prepared by blending intimately, with the aid of heat, one ounce each of the red oxides of mercury and lead and four ounces of Burgundy pitch, all in fine powder, with one ounce of Venice turpentine and twelve ounces of fresh butter.

T. B. SMITH, Otsego, N. Y.,§ regards the disease as of a mixed character, combining the distinctive appearances of several cutaneous affections. Many cases fell under his observation in which, in his opinion, the coexistence of [illegible] prurigo and scabies was well marked. In these cases alkaline, sulphurous and acid washes had but little effect except to allay the tormenting pruritus. Mercurial and sulphur ointments, when strong, were harmful. The most satisfactory remedies in his practice were the diluted citrine and white precipitate ointments and a solution of half a drachm of corrosive sublimate in eight ounces of water, with Fowler's solution internally and the removal of the digestive derangements that are frequently associated with the disease.

S. J. RADCLIFFE, Washington, D. C.,‖ had many opportunities during the war of examining and treating this harrassing affection, while on duty in the hospital at Annapolis. He considered the disease essentially an eczema. It spread irregularly over the whole surface of the body, but was found principally on the hands, fingers and elbows, scattered in distinct red spots and vesicles from the axilla to the wrist, on the nates and particularly in the popliteal space and about the ankles. The skin was frequently so stiff from crusts and painful from excoriated fissures as, with the associated itching, to occasion an almost unsupportable nervous irritation. The vesicles contained a highly excoriating limpid fluid which was capable of extending the diseased action. No parasite was discovered. The disease was attributed to want of cleanliness and the continued exposure to the rays of the hot sun in poorly-fed men, and was therefore perhaps of more frequent occurrence among our paroled prisoners than in the ranks of the army. In its treatment he tried without benefit ointments of sulphur and iodide of sulphur, washes of sulphuret of lime, corrosive sublimate, the oxides of mercury, muriate of ammonia, chloride of calcium and many other local applications, with Fowler's and Donovan's solutions internally. Ultimately he realized that better results followed the use of unirritating remedies. Strict attention to cleanliness and the application twice daily of a mixture of olive oil and glycerine seldom failed to effect a speedy cure.

J. H. CLAIBORNE, Surgeon, C. S. A.,¶ reports the disease as seen in the hospitals at Petersburg, Va., to have been papular and akin to lichen or prurigo. No acarus was present. In the absence of regular medical supplies he found that a decoction of poke-root used as a wash cured the uncomplicated papular disease in ten days, and that when the surface was much inflamed by scratching or other sources of irritation a decoction of broom-straw root or of slippery elm was of value. Mercury and arsenic were administered internally.

S. R. CHAMBERS, Ass't Surgeon, C. S. A.,** used an ointment composed of lard, sweet gum, resin, olive oil, sulphur and an extract of the inner bark of the cider, made by evaporating a strong decoction.

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* [illegible] *Reporter*, XIV, Philadelphia, Pa., p. 417.
† *Medical and Surgical Reporter*, XIV, Philadelphia, Pa., p. 76.
‡ [illegible]
§ *Ibid.*, XIV, p. 124.
‖ [illegible] XVI, [illegible]
¶ *Confederate States Medical and Surgical Journal*, Vol. I, 1864, p. 39.
** [illegible] *States Medical and Surgical Journal*, Vol. II, 1865, p. 11.

III.—POISONING.

Under this heading were reported among the white troops 3,288 cases, of which 97 were fatal. Some of these, including most of the fatal cases, resulted apparently from opium taken by mistake or with suicidal intent; but the mass of the cases consisted of a cutaneous inflammation of the head and face, sometimes of the upper extremities, and occasionally of the nates, scrotum and adjoining parts of the trunk and thighs, which was referred to the agency of the poison oak, *Rhus toxicodendron*. This inflammation was attended with much pain, heat and irritation, and the swelling sometimes, as in erysipelas, obliterated the features. The affected surface was of a lurid-red color, covered in aggravated cases with vesicles, the contents of which became encrusted on drying or oozed as a thin liquid from superficial fissures. There was usually little constitutional disturbance, but often much suffering from local irritation and loss of sleep. Generally the inflammation subsided in about a week or ten days without leaving subcutaneous suppurations. It was treated by aperients, cooling lotions, anodynes and hypnotics.

The records present only two cases illustrative of poisoning by deadly drugs:

CASE 1.—Private Walter Fitzgerald, Co. H., 4th V. R. Corps; age 68; was admitted June 14, 1865, with a rheumatic affection, from which he so far recovered as to be able to evade the guard and keep himself supplied with whiskey. On August 6 he had a slight attack of delirium which confined him to bed for some days, and on the 21st a more severe recurrence. At 9.40 P. M. of the 22d it was found that one ounce of laudanum had been administered by mistake: he was insensible, but could be aroused by shaking; pupils much contracted, pulse 150; respiration 10; skin pale and warm; hands like a washerwoman's. Eight grains of extract of belladonna were at once given and the patient was kept aroused by the galvanic battery and friction. At 10.30 the pupils began to dilate; pulse 144; respiration 10 when in repose, 14 when aroused; the skin seemed regaining its color and the face and hands were nearly natural. Half an hour later four grains of the extract of belladonna were administered, under the influence of which the dilatation of the pupils continued and the respiration became more frequent, 17; pulse 144; but the drowsiness increased, and the skin became cooler and assumed a blue color. Whiskey and carbonate of ammonia were given by enema. He lived until 5 P. M. of the next day. Artificial respiration was attempted. *Post-mortem* examination: Rigor mortis slight. The membranes of the brain contained three ounces and a half of bloody serum and the lateral ventricles half an ounce, the choroid plexus of each being enlarged; the cavernous portion of the right internal carotid contained a long fibrinous clot; the superficial cerebral veins were engorged. The lungs presented some old adhesions,—the right was congested, the left had a small vomica in its apex and miliary tubercles in its upper lobe. The heart was flabby and contracted; it contained fibrinous clots which extended into the great vessels; one of the aortic valves presented a cartilaginous deposit about the size of a small pea, another showed a harder deposit, the third was healthy. The œsophagus was red; the stomach normal; the liver enlarged and fatty; the gall-bladder distended; the spleen shrunken and flabby; the kidneys fatty,—the left of normal size, the right half the usual size and nodulated.—*Douglas Hospital, Washington, D. C.*

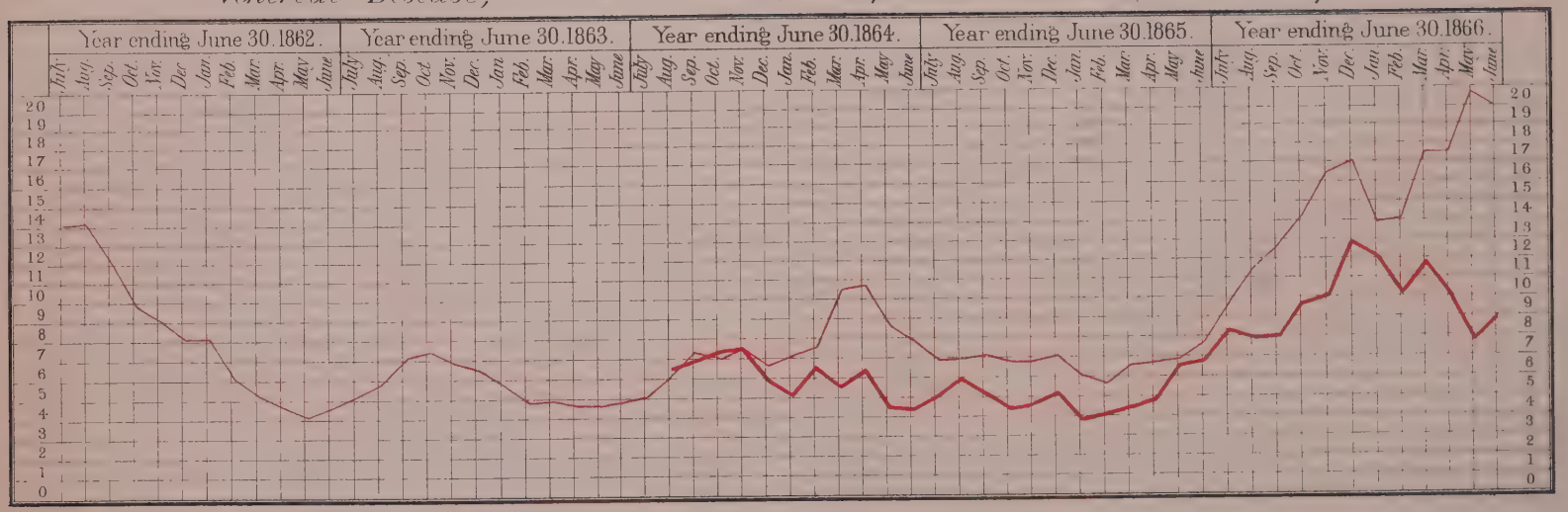
CASE 2.—Private Albert Boggs, Co. D, 1st Pa.; age 17; admitted Aug. 2, 1863. He had been attacked on the previous day with cholera morbus, for which a physician had prescribed sixty drops of laudanum every half hour; he had taken altogether between one ounce and one ounce and a half up to the time of his admission. His eyes were injected and watery, pupils contracted, head hot, face slightly flushed, lips blue, mind confused, pulse small and frequent, about 96. He became comatose and died on the 3d. Cold was applied to the head and sinapisms to the extremities. The record of the *post-mortem* examination gives no other information than that the head, trunk and upper extremities were cyanosed.—*Cumberland Hospital, Maryland.*

IV.—ALCOHOLISM.

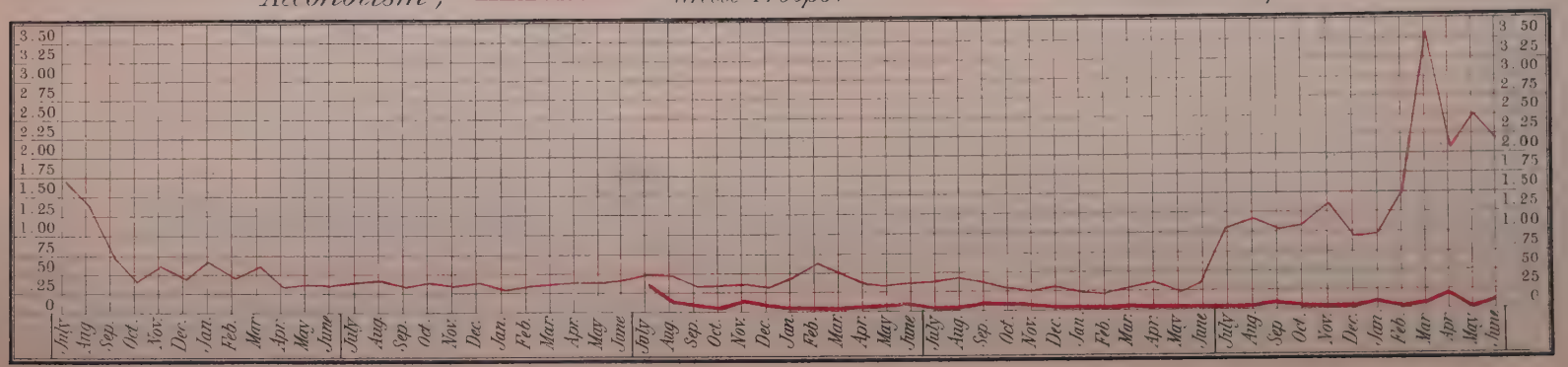
Under this term may be included the statistics of inebriation, delirium tremens and chronic alcoholism. Among the white troops there were reported during the five and one-sixth years 5,589 cases of inebriation, of which 110 terminated fatally; 3,744 cases of delirium tremens with 450 fatal, and 920 cases of chronic alcoholism with 45 fatal. These are equivalent to a rate of 4.6 cases annually per thousand of strength. Obviously troops stationed in the neighborhood of large cities furnished the greater number of the cases. The Army of the Potomac during its years of active service, ending June 30, 1863, '64 and '65, had rates of 1.5, 1.8 and 0.8 respectively, but during the year ending June 30, 1862, three-fourths of which was spent in the immediate vicinity of Washington, the rate was 5.3

Lines indicating the Monthly Rates of Prevalence of Venereal Disease and of Alcoholism among the White and the Colored Troops per thousand of each present:

Venereal Disease; ——— *White Troops.* ——— *Colored Troops.*


Year ending June 30.1862.
Year ending June 30.1863.
Year ending June 30.1864.
Year ending June 30.1865.
Year ending June 30.1866.
July Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Alcoholism; ——— *White Troops.* ——— *Colored Troops.*



cases per thousand men. For obvious reasons, also, the rates were higher at the beginning and end of the war than during its progress. The monthly variations are shown in the accompanying diagram. The annual rate among the colored troops, .22 per thousand, equivalent to 1 man annually requiring medical attendance on account of intemperance in every 4,500 men, contrasts favorably with the returns from the white troops, which indicate 1 case annually in every 220 men.

But sickness from this cause is mentioned here merely as a matter of record. It offers few points of interest statistically, and the recorded cases are such as may be paralleled daily in the medical experience of civil life.

Preventive measures belong rather to the government and discipline of camps than to their sanitation—to the military more than to the medical officer.

V.—VENEREAL DISEASES.

Venereal diseases were associated with intemperance in the conditions which favored their causation. Hence they were more frequent at the beginning and the close of the war than during its progress, and among troops stationed in the vicinity of cities than among those on active service. Elevations of the lines of prevalence during the continuance of the war correspond with the accession of fresh levies or the return of furloughed veterans. Among the white troops 73,382 cases of syphilis were reported, and 109,397 cases of gonorrhœa and gonorrhœal orchitis, giving a total of 82 cases of venereal disease annually per thousand men, as compared with 87.86 in our army before the war and 87.62 from the records of the ten years immediately following the war period.* Among the colored troops syphilis had an annual rate of 33.8 cases and gonorrhœal affections 43.9 cases per thousand of strength. The variations in the monthly rates are shown in the diagram facing page 890. The lines of syphilis and gonorrhœa run courses parallel to that of their consolidation.

The hospital records present 426 cases of venereal disease,—53 of gonorrhœa and 373 of syphilis. Of the former 50 were simple cases and 3 complicated with suppurating bubo. Of the latter 194 developed no constitutional symptoms,—among these, gonorrheal complications were present in 41 and supurating bubo in 77. It is impossible to determine, from the language of the record, the character of the primary sores in 179 cases which were followed by secondary symptoms. The most notable point connected with their history is the frequency with which sore throat, cutaneous eruptions and other manifestations of the constitutional taint are reported as having followed venereal sores associated with suppuration of the inguinal glands: 19 such cases are recorded.

Treatment as a rule was first restricted to the local lesions, mercury or iodide of potassium being withheld until the development of secondary symptoms. No reference is made to scorbutic complications nor to untoward results in constitutions undermined by the hardships of military service. In fact, a similar series of cases might easily have been gathered during the same period in the wards of our civil hospitals. A few reports on file indicate individual views of the method of treating these diseases:

Ass't Surgeon ROBERT F. STRATTON, 11*th Ill. Cav., June* 30, 1862.—It was impossible to cure gonorrhœa while the patients were exposed to the rain and had to sleep on the damp ground and live on a salt and stimulating ration.

Surgeon WILLIAM R. BLAKESLEE, 115*th Pa., Alexandria, Va., Oct.* 20, 1862.—Gonorrhœa was greatly modified and in most cases completely subdued by injecting a solution of chlorate of potash, one drachm in eight ounces, every

* See *supra*, Table IV, page 16.

hour for twelve successive hours, and then gradually ceasing its use during the next two or three days by prolonging the interval between each injection. Dietetic rules were observed, with rest and occasionally a saline laxative.

Surgeon A. F. PECK, *1st N. M. Cav., Los Lunas, N. M., Sept.*, 1862.—Nearly one-third of the cases this month consisted of gonorrhœa, which readily yielded to treatment. With much inflammatory action in the first stage, I generally prescribed a saline cathartic, rest, cooling lotions and low diet. After this stage had passed I found balsam of copaiba, powdered cubebs and magnesia given as a bolus, four or five times a day, to be very effectual. At the same time I used an injection of chloride of zinc, two to four grains to the ounce of water, once or twice a day. When the system is much reduced tonics are beneficial.

Surgeon ISAAC F. GALLOUPE, *17th Mass., Feb.* 20, 1863.—Syphilis and gonorrhœa prevailed extensively in the regiment during its stay in Baltimore. Rapid and complete recovery was secured in all cases treated as follows:—*Gonorrhœa:* Injections of a weak solution of sulphate of zinc, one grain to one ounce of water, every hour or half hour; light diet. By this treatment the disease was always cut short, no discharge appearing after the first use of the injection. *Syphilis:* Cauterization of the chancre in the first instance, followed by the continuous application of black wash. All cases thus treated recovered without secondary disease.

Ass't Surgeon P. W. RANDALL, *1st Cal., Fort Bragg, Cal., Jan.* 1, 1863.—For gonorrhœa my treatment, which is successful, consists of a thorough cleansing of the alimentary canal, rest, low diet, the balsam and cubebs internally, with urethral injections of nitrate of silver, sugar of lead or sulphate of zinc. For syphilis I use mercurial and saline purges, rest, low diet, iodide of potassium and bichloride of mercury, with caustic to chancres, warts or vegetations.

Surgeon J. G. BRADT, *26th Mass., New Orleans, La., Jan.* 1, 1863.—Of the various forms of venereal disease chancre of the non-indurated variety is the most prevalent. It is accompanied in a majority of cases with bubo. The sores yield readily to cauterization with acid nitrate of mercury and applications of black wash, the bowels meanwhile being regulated and the patient kept on low diet. But one case of indurated chancre has been observed, and this was unaccompanied by a bubo. It was treated with mercurials internally and pernitrate of mercury to the sore. Sufficient time has not yet elapsed to determine whether secondary symptoms will be developed. No case of non-indurated chancre has been followed by constitutional symptoms. Gonorrhœa is much less frequent than chancre, and more obstinate under treatment. My practice has been to use injections of sulphate or chloride of zinc; occasionally, when there is irritability of the bladder, I employ diuretics. The cases are prone to become chronic. I have no faith in the empirical use of balsams and diuretics, so long considered specifics in this disease. I consider that, by their tendency to over-stimulate the kidneys, they do more harm than good.

The reporter last cited, April 1, 1863.—I have not as yet seen the first case of secondary symptoms, although a sufficient period has elapsed for them to make their appearance. In two or three cases only have I considered it advisable to employ mercury internally. The remedy was continued until the gums were affected, which condition was kept up for ten or twelve days. Iodide of potassium was then given combined with tonics. I do not consider mercurials essential to the cure of the form of syphilitic ulcer most common in this city.

Surgeon DAVID WOOSTER, *5th Cal., Sacramento, Cal., Jan.* 13, 1862.—I inoculate every case of chancre. If the virus take, I treat locally and hygienically alone; if it fail to produce chancre after the third inoculation, I use protiodide. The cures in both series of cases are generally reasonably prompt, occupying from fifteen to rarely sixty days. I have not yet had secondary developments in cases the primary accidents of which have been treated at this post.

Surgeon ALLEN F. PECK, *1st N. M. Mounted Vols., Fort Stanton, N. M., Dec.* 31, 1862.—*Primary:* Cauterize with nitrate of silver, after which apply black or yellow wash until the sore is healed. *Consecutive:* If there is no constitutional contraindication I give mercurials,—the protiodide yields better results than any other preparation. If the patient improves I continue the remedy until the sores are healed and the induration dissipated, using at the same time disinfecting mercurial and astringent washes. If the system is exhausted I give tonics.

Surgeon EZRA READ, *21st Ind., Baltimore, Md., Sept.* 5, 1861.—For many years I have pursued the method of treatment by mercurial fumigation, which deposits the mercury upon the surface of the body when in a state of perspiration induced by the heated vapor of water surrounding the patient confined in a close and air-tight bath. This treatment is commended to our consideration because it eradicates the disease in a shorter period of time than is required by the internal use of mercury; moreover, when thus applied the constitutional effects of the mercury are under satisfactory control. In primary syphilis, after careful and thorough cauterization of the chancre, I regard fumigation as the best method of treating the disease, and as the most reliable means of preventing constitutional manifestations. In the secondary form I think it the only method by which a perfect cure can be effected.

Ass't Surgeon WARREN WEBSTER, *U. S. Army, Fort Larned, Kansas, Oct.* 1, 1861.—In this connection I desire to record my unwavering belief in the efficacy of the mercurial treatment in syphilitic complaints. I have had special opportunities among the Arapahoe and Kiowa Indians, who have been scourged for years with this disease and have never been subjected to mercurial treatment, of observing the natural course of the diseased action. It has been urged by many modern authorities that in the individual the virus of syphilis, if left to nature, will wear itself safely out. These supporters of the non-mercurial treatment assert, somewhat dogmatically, and it appears to me without much evidence to sustain their position, that mercury and syphilis together form in the system a sort of poisonous compound which produces the worst and most destructive forms of constitutional syphilis. Now, these Indians of the plains, who lead a simple and inartificial life, calculated by their habits of exercise and the mildness and salubrity of their climate to foster a vigorous physical condition, are many of them the victims of the most desperate forms of constitutional syphilis, evidencing itself in lost noses, vacant palates, and the vilest cutaneous affections, and this, too, without having probably taken a particle of quicksilver. The inference is obvious when I state that their disease,

on being attacked betimes, has generally kindly yielded to the judicious administration of mercurials. I may add that a somewhat extensive observation of this unfortunate disease among the natives of this region has confirmed me in the following beliefs, which have a bearing on its treatment. First: The virus must work in the tissues about the surface during four or five days before it is sufficiently elaborated to affect the system through the blood. If, during this time, the sore should slough or we produce this effect by caustic, the poison is destroyed or removed before it is ripe, and we need not administer mercury. Second: If the sore has not been destroyed or has not sloughed away, the poison has been carried by the absorbents to the glands in the groin. These inflame and suppurate, and with the pus the poison is discharged and does not further affect the system. In such a case we need not, I think, prescribe mercury. But again, we have the chancre of Hunter and Carmichael, in which the poison, instead of stopping at the glands and suppurating there, passes straight into the system at large, and a rash declares that the constitution is affected. When this chancre has had time to mature without being destroyed by caustic, then we must introduce the only medicine, mercury, which has the power of efficiently striving with the enemy.

Ass't Surgeon E. A. TOMPKINS, *4th Cal., Fort Yamhill, Oregon, April* 1, 1863.—The patient contracted syphilis in June last, a short time before I arrived at this post. He was relieved by the use of iodide of potassium in syrup of sarsaparilla. Small doses of corrosive sublimate were also given, and lunar caustic was applied to the chancres. A continuance of this treatment for three weeks enabled him to return to duty, though not entirely well. Five weeks later he was readmitted. All the indications of syphilis had disappeared, but he complained of violent pain in his head and his bowels were constipated. Twenty-five grains of calomel, followed by a black draught, relieved these symptoms; but he was forthwith taken with a violent pain of a neuralgic character in his left leg. This pain affected him at frequent intervals during the day and was nearly constant during the night, sometimes varying in its site. The painful leg was much colder than the other. He was treated first with an emetic, next with stimulating embrocations and then with blisters along the course of the affected nerves. After this iron and quinine were administered, with laxatives to guard against constipation. Anodynes were occasionally required for the relief of suffering. Chloroform was used externally, but with only temporary relief. He remained in the hospital over three months, during which period the affected leg diminished materially in size. At length the pain became less frequent and severe. The patient is now perceptibly recovering under the persistent use of iron and quinine, his leg at the same time being enveloped in cotton wadding and daily rubbed with stimulating liniment.

SYSTEMATIZED EFFORTS AT PREVENTION.—Efforts were made at Nashville and Memphis, Tenn., to suppress or limit the spread of these diseases among the troops, and, according to the testimony of the officers concerned, the results were highly satisfactory.

It appears from the records that Brigadier General R. S. Granger, in command at Nashville in June, 1863, was "daily and almost hourly beset" by the commanders of regiments and their surgeons to devise some way to rid the city of the diseased prostitutes infesting it. The matter was referred to the Provost Marshal, Lieut. Col. George Spalding, 18th Mich., who, by means of the police force and provost guard under his command, succeeded in placing on board a steamer which he had chartered all the women of the city publicly known to be of vile character. On July 8 the boat started for Louisville, Ky., but on arriving at that port the city authorities refused to receive the exiles. Cincinnati also closed her doors against them. A few were taken off at Newport, Ky., by a writ of habeas corpus, and these soon found their way back to Nashville. Ultimately, in accordance with orders from Washington, the boat returned to her starting point, and on August 3 disembarked her passengers to resume their former modes of life.

Meanwhile, Colonel Spalding, recognizing the failure of his attempt to remove the women, suggested a system of licensed prostitution, with frequent inspection for the removal to hospital of those likely to disseminate disease:

1st. That a license be issued to each prostitute, a record of which shall be kept at this office, together with the number and street of her residence.

2d. That one skilful surgeon be appointed as a Board of Examination, whose duty it shall be to examine personally, every week, each licensed prostitute, giving certificates of soundness to those who are healthy and ordering into hospital those who are in the slightest degree diseased.

3d. That a building suitable for a hospital for the invalids be taken for that purpose, and that a weekly tax of fifty cents be levied on each prostitute for the purpose of defraying the expenses of said hospital.

4th. That all public women found plying their vocation without license and certificate be at once arrested and incarcerated in the workhouse for a period of not less than thirty days.

The plan having been approved by General Granger, medical officers were detailed for

duty in connection therewith, a hospital was established for the treatment of diseased women, and all prostitutes were required to present their certificates of inspection and procure a license before a given date, August 20. It is assumed that many diseased courtesans left the city on the publication of the order rather than be subjected to hospital treatment. Certain it is, however, that the number at first requiring medical attendance was small, the daily average of sick not exceeding twelve. But in November, shortly after the passage of the 11th and 12th Corps through the city, twenty-eight new cases were received. Up to January, 1864, the whole number examined, licensed and registered was 300, of whom 60 were diseased. On April 30, 1864, the whole number licensed was 352, and the number of cases treated in hospital 92; but some of these cases were recurrences, as they were represented by only 64 women. Twelve months after the institution of the system 456 white cyprians had been registered, and it is stated, in explanation of the rapid increase in the number, that many of the better class of prostitutes had been drawn to Nashville from northern cities by the comparative protection from venereal disease which its license system afforded. About this time the supervision was extended to colored prostitutes, 50 of whom had been registered. Of the whole number of women who reported for examination but four are said to have opposed the system.

Under these regulations a marked improvement was speedily noticed in the manner and appearance of the women. When the inspections were first enforced many were exceedingly filthy in their persons and apparel and obscene and coarse in their language, but this soon gave place to cleanliness and propriety.

The sum suggested by Colonel SPALDING proved inadequate to meet the expenses of the hospital. The inspection fee was accordingly raised to one dollar, but even then much difficulty was found in meeting expenses, as some of the women were unable or declined to pay for their certification.

The influence of this supervision on the health of the troops in the vicinity of the city is illustrated by Surgeon W. M. CHAMBERS, U. S. Vols., who had charge of Hospital No. 15, which, in February, 1864, was converted into a hospital for venereal cases. According to his statement, up to June 30, 994 cases were admitted, and of this number 13 only had contracted the disease in Nashville. Surgeon R. FLETCHER, U. S. Vols., in charge of the Female Venereal hospital, in a letter dated August 15, spoke of the system in these terms:

> It is not to be supposed that a system hastily devised, established for the first time on this continent, and certain to encounter all the obstacles that vicious interests or pious ignorance could put forth, should be other than imperfect. We have here no Parisian "Bureau des Mœurs," with its vigilant police, its careful scrutiny of the mode of conduct of houses of prostitution, and its general care of the public welfare both morally and in its sanitary consideration. This much, however, is to be claimed, that after the attempt to reduce disease by the forcible expulsion of the prostitutes had, as it always has, utterly failed, the more philosophic plan of recognizing and controlling an ineradicable evil has met with undoubted success.
>
> Among the difficulties to be overcome was the opposition of the public women. This has so effectually disappeared that I believe they are now earnest advocates of a system which protects their health and delivers them from the extortion of quacks and charlatans. They gladly exhibit to their visitors the "certificate" when it is asked for, a demand, I am informed, not unfrequently made. The majority of the patients in the hospital are not sent from the inspection room, but consist of women who, suspecting their malady, have voluntarily come for examination and treatment.
>
> That a vast amount of venereal disease still exists in this army is incontestable, but from careful inquiries made of the men, when opportunity served, and from the reports of surgeons of regiments, the origin of the evil has been but to a small extent traceable to this city. When a soldier of the post forces is infected it is not uncommon for his captain to report the case, with the name of the suspected woman, who is immediately arrested and examined.

About a year after the inception of preventive measures at Nashville, Tenn., L. L. COXE, an inspector or agent of the U. S. Sanitary Commission, submitted to General C. C. Wash-

burne, commanding the Department of West Tennessee, a series of rules and regulations for the government of prostitutes residing in the city of Memphis. These were of a more elaborate and detailed character than those on which the Nashville system was based. The action taken by General Washburne does not appear on the record; but it seems that the regulation of the evil was under consideration in Memphis itself at the time, as on August 2, about three weeks subsequent to the date of Dr. COXE's communication, the provisional council of the city adopted a resolution authorizing the mayor, in connection with the military authorities, to make and enforce necessary and proper rules to control and mitigate the evils of prostitution within the limits of the city. In pursuance of this resolution Lieut. Colonel T. H. HARRIS, Assistant Adjutant General, 16th Army Corps, on duty as mayor of the city, sent Dr. COXE to Nashville to investigate the operation of the system in force at that station. A favorable report was submitted on August 26, and on the same day the Commanding General of the Department directed Colonel HARRIS to make the necessary arrangements on behalf of the military authority. This officer, now representing both the military and civil authorities of the city, communicated his purpose to the Adjutant General's Office, Washington, D. C., August 31. His views were approved by Assistant Surgeon General R. C. WOOD and Surgeon General BARNES, and he was authorized to call upon Surgeon B. J. D. IRWIN, U. S. Army, Superintendent of Hospitals, for the detail of two medical officers to make the weekly examinations. Meanwhile arrangements had been made for the reception of diseased women into the city hospital, and on September 30 the system was instituted by the opening of a registry office and the promulgation of the following order among the women concerned:

PRIVATE CIRCULAR.

CITY MEDICAL INSPECTION DEPARTMENT,
MAYOR'S OFFICE, MEMPHIS, TENN., *September* 30, 1864.

All women of the town, in the city of Memphis and vicinity, whether living in boarding-houses, singly or as kept mistresses, are notified that they must hereafter be registered and take out weekly certificates.

Women who can show that they are living privately with a responsible citizen of good character will be exempted from the weekly medical inspection by calling weekly, between 2 and 5 o'clock P. M., at the Mayor's office, and paying the regular hospital fee. No woman residing in a boarding-house will be registered as a KEPT woman.

All other than such kept women, whether practicing prostitution regularly or occasionally, are ordered to call on the City Medical Inspectors at the private office, second story over the confectionery store on corner of Main and Union streets, entrance through the store, or at No. 21 Union street, on any afternoon between two and four o'clock before the 10th of October, and receive a medical certificate, for which two dollars and fifty cents will be charged.

Or women can receive the medical certificate at their homes by requesting the Medical Inspector to visit them, and paying one dollar extra for the visit. A note directed to lock-box 201, post-office, giving the street and number, will be attended to.

On receiving the medical certificate a ticket of registry must be called for personally at the Mayor's office, for which ten dollars will be charged.

The money received goes to the support of the private female wards in the new City Hospital, on the corner of Exchange street and Front Row, into which registered women are admitted at any time for any disease upon showing their weekly certificate, are afforded all the privacy and comfort of a home, and nursed by an experienced matron and female nurses, free from any cost or charge whatever.

"Street walking," soliciting, stopping or talking with men on the streets; buggy or horseback riding for pleasure through the city in daylight; wearing a showy, flash or immodest dress in public; any language or conduct in public which attracts attention; visiting the public squares, the New Memphis theatre, or other resort of LADIES, are prohibited and forbidden.

Good conduct will ensure relief from detective or police visits, exposure or loss, and a violation of the orders will inevitably incur punishment.

Any woman of the town, public or private, found in the city or vicinity after the 10th day of October, 1864, without her certificate of registry and medical exemption certificate, will be arrested by the police and punished.

This circular is intended for the information of the women only, and must not be shown or given to men.

By order of the Mayor:

JOHN B. GRAY,
City Medical Insp. Dep't.

The result is shown in the following report of Provisional Mayor, Mr. CHANNING RICHARDS, rendered Feb. 11, 1865, a short time before the system was discontinued. As

this officer evidently disliked his connection with licensed prostitution, and endeavored to relieve the civil authority from all responsibility in its inauguration. His testimony to its successful operation is all the more valuable:

In accordance with orders of Feb. 9, 1865, I have the honor to submit the following report, as called for, in relation to the City Medical Inspection Department:

The failure of all efforts made by the military authorities to suppress the vice of prostitution in the city induced the said authorities to introduce a system of registration. On the 31st of August, 1864, the Commanding Officer of the District of West Tennessee, by Special Order No. 129, Ex. IV, entrusted the matter to the control of Lieut. Colonel HARRIS, the acting mayor of the city, who was instructed to make the necessary arrangements.

The first requisite was proper hospital accommodations, and as the city was then preparing a new hospital, arrangements were made for the reception of diseased women into that institution.

The registry was opened on September 20, since which time one hundred and thirty-four public women have been registered, of whom one hundred and ten are now in the city, to wit: 14 housekeepers, 4 kept mistresses and 12 boarders. The inmates of all public houses and all other white courtesans known to the department are registered. It is impossible to say how many have evaded the orders and eluded detection, but there is no reason to suppose that there is any considerable number.

The total receipts of the department to Feb. 1, 1865, are $6,428.65: expenses during the same time, $2,535.16; the balance of $3,893.49 has been passed to the credit of the hospital fund.

The city physician is charged with the medical inspection of the women, for which he receives no compensation in addition to his salary from the city as city physician. The salaries paid to the employés of the department are as follows:

	Per annum.
Registrar	$200 00
Inspector	115 00
Hospital Assistant	30 00
Assistant Physician } In addition to pay from the city as hospital steward, matron	65 00
Hospital Matron. }	15 00
Total	$425 00

The fees charged for examination are as follows:

For examination at inspection room	$2 50
For examination at residence	3 50

No portion of these fees is paid to the examining physicians, nor do said physicians receive any "special fees" or extra compensation of any kind for any services connected with the department.

The total number of admissions of diseased women into hospital to date through this agency is 84: the number now there is 20. It is impossible to give the expenses of the hospital department, because the women are treated in the city hospital with the city patients. That hospital was fitted up by direction of the Commanding General at an expense of about $50,000—the reception of these women was contemplated in the directions. The monthly expenses are about $2,500. If a hospital were fitted up for the special accommodation of the women the expenses would be scarcely less than half that amount.

In conclusion, I desire to say that I have considered myself as acting for the military authorities in this matter, and that the city government as such has never been connected with it; neither myself nor others belonging to the department have any desire to retain that connection longer than is entirely satisfactory to the military authorities. The matter was originally entrusted to the mayor of the city because the city was prepared with the necessary means of enforcing the orders; but if the United States Medical Department is now able to provide for the women found diseased, and desires to assume their examination and treatment, such an arrangement would to no one be more satisfactory than to the city physician and myself, for I need scarcely say that any connection with such a department is extremely unpleasant. But I shall certainly regret the abandonment of the system, for the result of my own observation has been decidedly favorable to it. During my connection with the Provost Marshal Department in this city I was cognizant of the efforts to suppress this vice and their utter failure. In contrasting the present system I see many advantages to recommend it, for while it does not encourage vice it prevents to a considerable extent its worst consequences.

For the successful operation of the system the credit is entirely due to Mr. J. C. HAZLETT, who is charged with the registration, and to Dr. A. GREEN, the city physician, who conducts the medical examination and treatment of the women. For the system itself credit is due to Lieut. Colonel HARRIS, who was acting mayor at its inception.

CHAPTER XII.—ON THE GENERAL HOSPITALS.

At the outbreak of the civil war this country knew nothing practically of large military hospitals: indeed, most of our volunteer medical officers knew nothing of military hospitals, small or large. The troops were raised by regiments. The Regulations provided hospital-tent accommodation in proportion to the number of men on the regimental rolls. Perhaps

the first military hospital which many of our officers entered was that of their own newly outfitted regiment. These small tent-wards appeared at first sight to have nothing in common with the large civil hospitals, which, for the sake of economy, had one tier of wards piled over another in a solid and permanent structure: but subsequent experience speedily showed that an aggregation of regimental hospitals might be consolidated into a single establishment for a larger body of troops, as a division or corps, with much advantage to the sick and wounded of the command; and that a hospital thus constituted, if detached from its regimental connections, would necessarily be a large general hospital.

At first, when the sick accumulated in a regimental hospital beyond the capacity of the regulation canvas shelter, a neighboring house was usually converted into a hospital; and in like manner, when those of many regiments accumulated at some depot, a church, factory or other large building was extemporized into a brigade or general hospital.

The first military hospitals were opened in Washington, D. C. The E street Infirmary and the Union Hotel both received patients in May, 1861; the former, a city hospital, was destroyed by accidental fire in November; the latter, in the Georgetown district, near the bridge over Rock Creek, was abandoned when better facilities became available,—in May, 1862, its patients, medical staff and material outfit were removed to the recently established Cliffburne hospital;* nevertheless, at a later period of the war, when the number of sick and wounded in the city required all its available shelter, the Union Hotel was for a time reopened. Among the buildings temporarily appropriated for hospital purposes were the Trinity churches of both Washington and Georgetown, the Dumbarton street hospital and Water's warehouse, the Georgetown College, Caspari's Hotel, Island Hall, Odd Fellows Hall, Grace Church, the Church of the Epiphany, Ryland Chapel, Union Chapel, the Baptist church on E near 6th, the Unitarian on 6th and D, and the Ascension hospital, comprising the Church of the Ascension, the Presbyterian church on 9th near H and the 8th street Methodist church. Besides these, temporary hospitals were established in the Capitol and Patent Office, in Saint Elizabeth's Insane Asylum and in many private residences.

In Alexandria, Va., hospitals were organized in abandoned dwellings, warehouses, churches, seminaries, etc., the whole constituting the three divisions of the General hospital of that place. The building first occupied was the old Hallowell House on Washington street, opened about the time of the battle of Bull Run, July 1, 1861. Afterwards many others were added, as the new Hallowell house, a private residence: the Tebb's house, previously known as the Bell Haven Institute, a female seminary; the Fairfax street hospital, also a seminary; the King street hospital, three private dwellings; the Fowle and Johnson houses on Prince street; two residences on Wolfe street: the Methodist church on Washington street and the Grosvenor house on the same street near the corporation limits. The Fairfax Theological Seminary, near the city, was used as a brigade hospital by the troops of Kearny's Division during the autumn of 1861 and the winter following; after the army moved this establishment assumed the character of a general hospital on account of certain sick men that were left behind in it.

In Maryland, Baltimore contained one or two notable instances of extemporized hospital accommodation, as the National Hotel and West's warehouses. The buildings of the Naval Academy at Annapolis and those on the grounds of the Agricultural Society of Frederick Co. were early converted to hospital uses.

* *See infra*, page 916.

The Christian street hospital, Philadelphia, opened in June, 1861, continued for several months to be the only general hospital in that city. Not until the Army of the Potomac was preparing to move on the campaign of 1862 were increased accommodations required. On the breaking up of the brigade and regimental hospitals of that army and the removal northward of their inmates, a number of buildings were hastily transformed into hospitals, all of which were at first considered wards of the Military hospital at Philadelphia, with headquarters in the Broad and Cherry street building,—the position of this ward on the railroad making it as it were the entrance to the general hospital. The Christian street building was previously a commissioners' hall, Broad and Cherry a railroad depot, Fifth and Buttonwood a coach factory, Twenty-fourth and South street a silk factory, Sixteenth and Filbert an old arsenal. In a few months the Philadelphia hospital was reorganized and each of the establishments, hitherto its wards, became separate general hospitals.

North of Philadelphia there were but few extemporized hospitals. Factory buildings were occupied in Newark, N. J. A three-story cabinet factory contained most of the hospital beds in Elmira, N. Y. Contracts were made at Rochester and Buffalo with the civil hospitals at 50 to 75 cents daily per bed. The Mason hospital in Boston, Mass., was a private residence, given up rent-free by its owner; this was the only general hospital established in Boston during the war, and for the greater part of the war period the only government hospital in the state of Massachusetts.

The hospital in the Hygeia Hotel, Fort Monroe, Va., was for some time the only establishment of the kind south of the Department of Washington: at a later date the Chesapeake Female Seminary was converted into the Chesapeake hospital. At Portsmouth, Va., the Marine hospital was used, and the Balfour hospital consisted of two hotels, a car factory, two churches, three public halls and twenty hospital tents.

Many general hospitals connected with the western armies were extemporized. In Cincinnati, Ohio, the hospital on Third street, which was the first one opened, had previously been an orphan asylum, and the West End hospital a school-house. The Marine hospital of that city is said to have been well adapted for the comfort and cure of the sick. The hospital at Mound City, Ill., was constructed from a block of new tenements. Hospital No. 1, Quincy, Ill., had been a furniture warehouse, and No. 2 a carriage factory. At Lexington, Ky., the University buildings were impressed into service. In Louisville the improvised hospitals were at first known by number only, thus: No. 1 was a warehouse opposite the depot of the Louisville and Nashville railroad; No. 2, a machine-shop corner 8th and Green streets; No. 3, a seminary; No. 4, a plough factory; No. 5, a block of stores; No. 6, a private residence, etc. The buildings converted to hospital use in Nashville, Tenn., were also known by number. Some of them, as the Howard High School and a gun-factory building, constituting Hospital No. 1, are said to have answered their purpose admirably. At Memphis, Tenn., large buildings constructed for mercantile purposes became converted into the Washington, Webster, Gayoso and other general hospitals; the Overton Hotel also was used. At Helena, Ark., the residence of the Confederate General Hindman became a hospital. St. John's College, Little Rock, formed the basis of a Confederate hospital, which was afterwards continued as a U. S. establishment. The Good Samaritan and the Marine hospitals of St. Louis, Mo., having been built for hospital use, may be considered as instances of the highest grade of adaptability to the necessities of the period. In New Orleans, La., several hotels, as the St. James and the St. Louis, and the University and other buildings, were used. The

general hospitals for the colored troops and contrabands were established in sheds, originally cotton-presses; these, when walled in and ventilated by louvered turrets, are said to have made excellent wards.

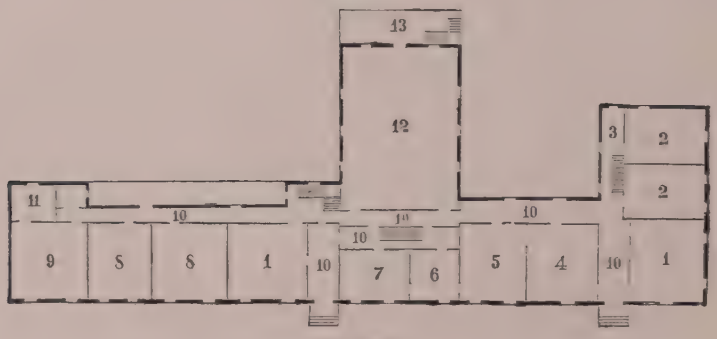
The records contain many elaborate plans of these extemporized hospitals, but no good purpose would be accomplished by presenting them at this time. A few will serve to show the general character of the whole. The descriptive outlines submitted below have been compiled from the regular and special reports of medical inspectors and surgeons in charge, save in a few instances specially noted, in which a particular report has been quoted or summarized.

The SEMINARY HOSPITAL, GEORGETOWN, D. C., was opened July 23, 1861. It consisted of a three-story brick building with a basement, corner of Washington and Gay streets, formerly occupied as a young ladies' seminary. It faced the west, 178 feet on Washington street, with a wing, 50 feet, on Gay street, and a second wing extending back 40 feet from the centre of the main building. Exclusive of the basement it contained 45 rooms, of which 32 were in use as wards,—the remaining 13 having been occupied as offices, dispensary, reception-room and the private rooms of officers, cadets and female nurses; the kitchen, mess-room, laundry, store-rooms, etc., were in the basement. The dimensions of the wards varied considerably; generally they were small, containing only three or four beds; two were comparatively large, containing twenty beds each. The average air-space was 596 feet to each of 147 beds, or 713 to each of 123 beds. During the warm months, with the doors and windows open and ventilation free and uninterrupted, as many as 190 patients were cared for in this hospital at one time; but Ass't Surgeon J. R. SMITH, U. S. Army, reduced the number of beds to 123 during the winter on account of the absence of satisfactory means for renewing the air. The ceilings were low,—in fourteen rooms the height was less than eight feet; in only one room did it reach eleven feet. Gas and hot and cold water were distributed throughout the building. Many of the rooms were at first without means of warmth. Notwithstanding its disadvantages this hospital was regarded favorably by the medical officers connected with it, as it was quietly situated and had porticoes and a large well-shaded yard in its rear for the use of convalescents. For the plan of this hospital see next page.

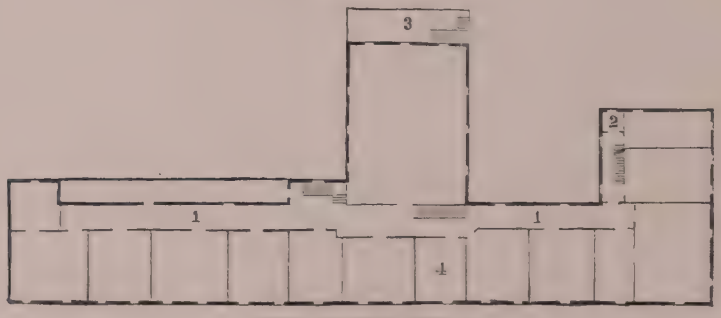
The NATIONAL HOSPITAL, BALTIMORE, MD.—*Extract from a report of* ROBERTS BARTHOLOW, *Ass't Surgeon, U. S. Army.*—Notwithstanding the dissimilarity in *uses*, there is much similarity in the *needs* of a large hospital and a hotel. In both the business of cooking, eating, sleeping are important concerns, and the manner of doing these with the greatest regard to the personal well-being of the inmates involves all the manifold relations of sanitary science. The National Hotel was organized for hospital purposes by Ass't Surgeon W. A. HAMMOND, U. S. A., in September, 1861. The prominent reason probably for the selection of this building was the convenience of the situation, being in the immediate vicinity of the Baltimore and Ohio Railroad depot and within six hundred yards of the harbor. The relation of the city to the great lines of communication with our armies in the field then and subsequently vindicates the wisdom of the selection. Some sanitarians have objected to this locality on account of its lowness and vicinity to tide-water. A hospital for the reception of sick and wounded patients obviously should be as near rail and water transportation as possible; and such objections should be held secondary to this necessity. Besides the hotel a large piano factory and eleven dwelling-houses, situated on both sides of Camden street, have been hired for hospital purposes. The National contains the appointments usual in a modern hotel. It is five stories high and contains fifteen wards, various offices, kitchens, store-rooms, laundry and bake-house, as follows: A large hall on the first floor communicates with the office, dispensary, water-closets, lavatory and dining-room; a broad circular stairway passes from this hall through the centre to the top of the house, and has opening into it the corridors between the wards. The wards open from opposite sides into the corridors and consist chiefly of suites of rooms. The front or rear of these rooms have large windows opening externally above the elevation of surrounding houses. The basement contains liquor and commissary store-rooms, coal-cellars, furnace, bake-house and pastry-room. In this part of the hotel building the defects of the situation appear. From the lowness of the ground and defective drainage or original imperfections in the water-pipes permitting leakage, water constantly rises in this basement and a deep well and pump have been always necessary to prevent overflow. The expensive attempts to remedy this evil have had but partial success, and the flow of water requires the more or less frequent use of the pump. The dwelling-houses are all on the same general plan, having hall, parlor, dining-room and kitchen upon the first floor, and rooms of various sizes in the upper stories. The piano factory is five stories in height and has a large and small ward on each floor. The large wards contain twenty beds each and the small ones eight, allowing to each patient 800 cubic feet of air. For convenience of administration the houses on the north side of Camden street are connected with the hotel and on the south side with the piano factory. All the buildings are of brick and, excepting five wards of the factory, have plastered ceilings. Many of the wards in the dwelling-houses have papered walls, but the principal wards in the hotel are hard-finished.

Natural currents of air have been wholly relied upon to ventilate the hospital. All the wards in the hotel having ample window-space, and nearly all open grates, there is nothing to be desired as to artificial arrangements. Moreover, the passages between the wards being connected with the central hall and stairway, and having windows at one extremity and transom-windows over the doors of the suites of rooms, an upward current of air from without inward is constantly passing to the ventilator in the roof in addition to the local currents in each room. To prevent interference with this system of currents a block of wood large enough to secure an inch of space is

BASEMENT.



FIRST FLOOR.



SECOND AND THIRD FLOORS.

SEMINARY HOSPITAL, GEORGETOWN, D. C.—*Scale* $\frac{1}{32}$.—*Basement:* 1, Dining-room; 2, Kitchen; 3, 3, 3, Closets for stores, pantries, etc.; 4, Store-room; 5, Wash-room; 6, 6, 6, 6, Rooms for attendants; 7, Extra-diet kitchen and 8, its pantry and store-room; 9, Sitting-room; 10, Convalescents' room; 11, Porch; 12, Passages. *First floor:* 1, 1, Offices; 2, 2, Officers' quarters; 3, Bath-room and water-closet; 4, Officers' mess-room; 5, Linen-room; 6, Store-room; 7, Female nurse; 8, Attendants; 9, Dispensary; 10, Passages; 11, Steward's room; 12, Ward No. 1; 13, Porch. *Second and third floors:* 1, Passages; 2, Water-closet and bath-room; 3, Porch; 4, Kitchen for cooking delicacies by gas. The various other apartments were used as wards.

attached to the top of each window and the transoms are removed from the doors. Soldiers are not regardful of the necessity for fresh air and sunshine, and the opportunity of shutting out both must be denied them. A large furnace in the cellar suffices to heat the entrance-hall, dispensary, dining-room and stairway; but as the air supplying the pipes is obtained from the cellar, the furnace is not a desirable addition to the means of ventilation. The wards of the piano factory have large windows at either extremity, and hence are abundantly supplied with air and sunshine. The dwelling-houses were not built with reference to these points. To produce as favorable a sanitary condition as possible the windows of the houses are kept open by blocks of wood, as in the hotel, and wood fires maintained in open fireplaces. The elevation of the hotel and piano factory being considerably greater than the surrounding houses, the supply of air and sunshine is not hindered from any quarter.

Water is obtained from the street mains and is distributed in lead pipes. In the hotel there are four bath-rooms supplied with hot and cold water, a bath-room and lavatory in each of the dwelling-houses and a bath-room and lavatory connected with each of the large wards in the piano factory. On the first floor of the hotel, adjoining the main hall, there is a lavatory containing six porcelain bowls, each supplied with hot and cold water, a urinal having an uninterrupted water-supply, and in the same apartment six water-closets either self-acting or operating by a knob, containing porcelain bowls and traps. On each floor above there is a single water-closet similarly arranged and supplied. The discharges from these water-closets are conveyed through iron pipes to the main sink in the rear of the hospital, where the solid portions are deposited, the fluids passing through an earthen pipe from this sink into

a street-sewer. The water-closets in the piano factory have cast-iron bowls, and the water is let on at the will of the operator—both objectionable arrangements. The water-closets in the principal dwelling-houses are attached to the bath-rooms and are in all respects like those in the hotel; but in several the latrines are primitive in style, consisting of wooden seats and a receiving barrel sunk in the ground. Gas-pipes extend throughout the hospital.

In the hotel there are two kitchens, a small one for the lady superintendent of the female nurses, where the delicacies for the sick are cooked, and the principal kitchen. The former is furnished with an ordinary cooking-stove and the latter with a range having sufficient capacity to cook for three hundred men; the piano factory kitchen has a range of the same capacity, and each dwelling-house has either a range or a cooking-stove. All of these kitchens contain the necessary appliances, hot and cold water, wash-rooms, closets and cooking utensils.

The laundry has twelve fixed tubs with hot and cold water laid on, a large copper boiler for boiling clothes, and washing-machines. The ironing-room is in the basement next to the bake-house; the range for heating the irons contains the water-back for the laundry.

The bake-house has an excellent oven for baking 200 one-pound loaves, and is supplied with the necessary mixing-boxes, trays, malt-tubs, baking-pans, baker's scales, bread-tables and shelves.

There are store-rooms for subsistence supplies, liquors, medical stores, unissued clothing, soiled clothes, knapsacks, unclaimed arms and accoutrements and the effects of deceased soldiers.

Compared with the limited ward-space, the complexity of the hospital arrangements is very great and the administration of the hospital proportionately difficult. Allowing to each patient 800 cubic feet of space, the whole number of beds is 700. The average daily number of patients is not probably more than 450, consequently the allowance of atmosphere is ordinarily much greater than that indicated above. Assuming 1,200 as the minimum and 1,800 as the maximum allowance of cubic feet of atmosphere to be given to each patient in permanent hospitals, the Camden street hospital, if full, would be too much crowded. Medical Inspector PERLEY, U. S. Army, has mentioned a deficiency of air-space as one of the objectionable features of this hospital.

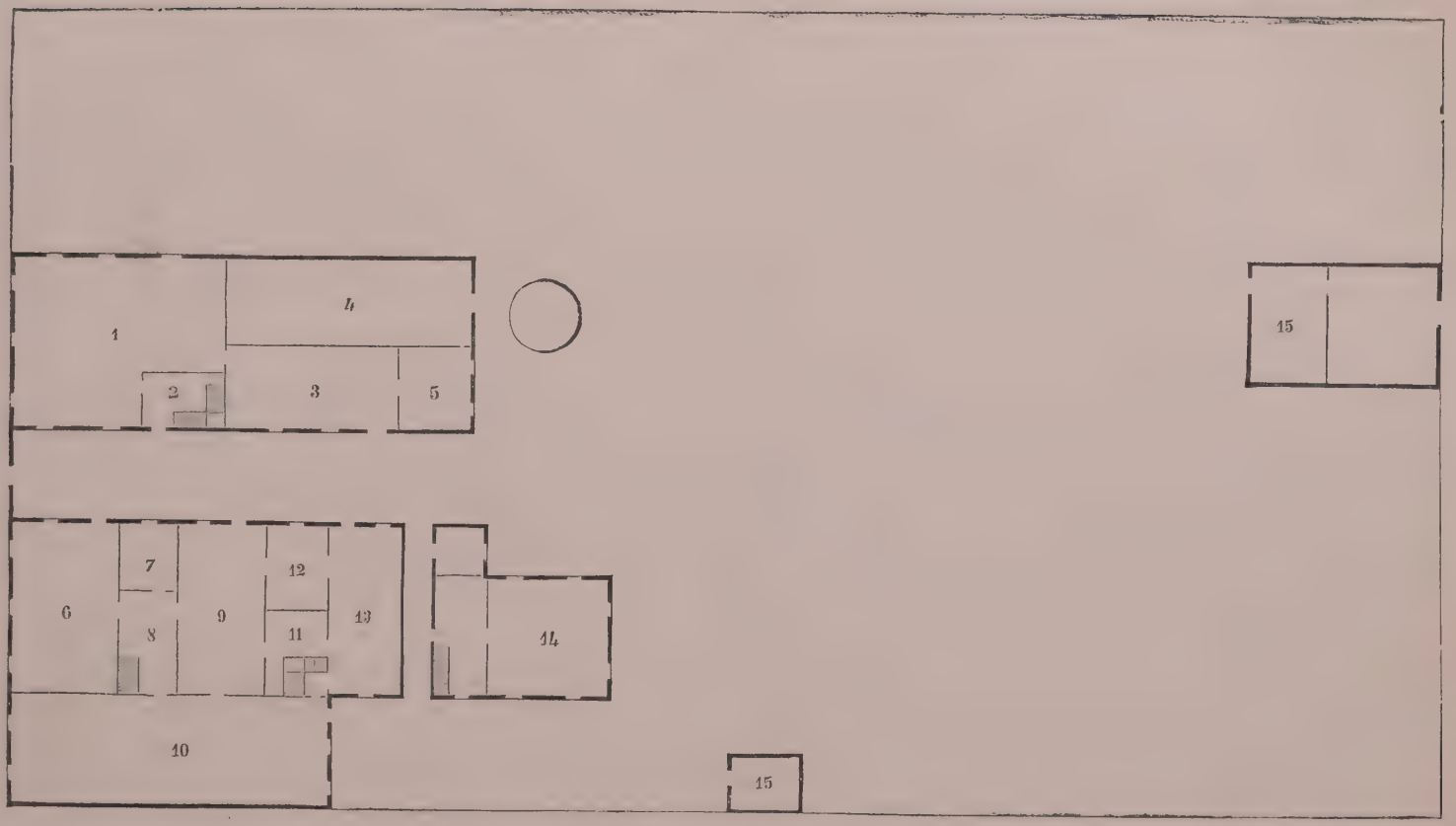
The sudden importance given to sanitary science in its application to the construction and arrangement of our military hospitals has had the effect of developing various crude, undigested and indigestible opinions. The maximum allowance of air-space may not prevent the occurrence of hospital gangrene, pyæmia and erysipelas, as the history of some of the new civil hospitals in Europe, built with especial regard to hygienic rules, will show. The 1,800 cubic feet of air allowed a patient may be foul air, and hurtful simply because stagnant. Sufficient space between the beds and a constant renewal of the air are more important elements than the number of cubic feet per bed. With respect to these two elements this establishment is not greatly deficient.

The patients in this hospital being distributed in small wards over a great extent of buildings, the medical and administrative service requires a force of physicians, wardmasters and attendants greater than a pavilion hospital of the same capacity. * * * It is not easy to transport a patient, ill or badly wounded, up five stories of stairway. It was therefore one of the earliest cares of Dr. HAMMOND to have constructed an admirable arrangement for elevating patients—a large dumb-waiter. When the piano factory was converted into a hospital the same mechanical contrivance was adopted. Not only are these elevators useful in transferring patients, but they are constantly employed for manifold purposes in the daily economy of the hospital service, for carrying up food and clothing and for sending down the dead, soiled clothes, utensils, etc.

WEST'S BUILDINGS, BALTIMORE, MD., consisted of a block of six warehouses each having three stories and an attic. The brick walls had no interior finish, but as they were thirty-four inches thick moisture was seldom observed to penetrate them. These houses were each 24 feet wide, but their depth varied from 107 to 124 feet. The ceilings were too low for the area of the rooms, being 11 feet high on the first floor, 9 feet 6 inches on the second and 9 feet 2 inches on the third floor. The first floor was unsuitable for ward use,—it was flagged, and deficient in light and ventilation; it contained the offices, kitchens, bakery, dining-room, laundry, store-rooms, guards' quarters and a few small rooms for employés.

The twelve rooms on the second and third stories were used as wards. Their dimensions corresponded with those of the several buildings; they contained from 32 to 39 beds each, giving a hospital capacity of 400 beds with 800 cubic feet of air per bed. The wards of each floor communicated freely with each other by doorways in the party walls. The four exterior wards, two on each floor, had good light and ventilation by 10 windows each, 4 along the length of each ward and 3 at each end; but the eight interior wards, four on each story, were lighted and ventilated only by the end windows. The wards were reached by interior stairways having no direct communication with the external air. To improve the ventilation wooden shafts were extended from the ceilings of the various wards to the ridge of the roof, but no current was established through them, as they were too narrow and turned twice almost at right angles in their course. The wards were unequally heated by coal-stoves. There were four bath-rooms and water-closets, two on each floor, or one to every three wards, but as each closet contained only one seat a majority of the patients had to make use of the sinks in the yard. The water-closets were fitted with urinals, but as these were untrapped they emitted an ammoniacal vapor. The attics were used as store- and knapsack-rooms and as quarters for nurses. The officer of the day had a room on the flagged first floor, but no other officer had quarters in the building.

The OLD HALLOWELL HOUSE, ALEXANDRIA, VA., formerly known as "Hallowell's School," on the west side of Washington street, between Queen and Cameron streets, was an old and irregular brick building composed of a main portion and three additions. The ground-floor of the main building was used as a dining-room for nurses, store-room, pantry and kitchen: the office and two rooms for employés were on the first floor: the second story contained eleven beds for patients in three wards: the third thirteen beds in three wards, and the attic eleven beds in three wards. The one-story addition on the north side ran parallel with the main building and contained nineteen beds in a space 50 × 17 feet: this ward was well lighted and ventilated by two windows at each end and three movable



OLD HALLOWELL HOUSE, ALEXANDRIA, VA.

Ground Plan: 1, Dining-room; 2, Hall; 3, Wash-room; 4, Commissary store-room; 5, Dead-room; 6, Drying-room; 7, Steward's kitchen; 8, Hall; 9, Dining-room for nurses; 10, Ward—19 beds; 11, Pantry; 12, Store-room; 13, Kitchen for patients; 14, Laundry; 15, 15, Latrines.

OLD HALLOWELL HOUSE.

First Floor.—1, Hall; 2, Office; 3, Steward's office; 4, Surgeon in charge; 5, Steward's bed-room; 6, Reading-room; 7, Clerk's office; 8, Linen-room; 9, Hall; 10, Dispensary; 11, Sleeping-room for clerks; 12, 13, Wards—39 beds; 14, Porch. The second and third stories and attic of main building contained small rooms for patients and attendants.

skylights (3 × 7) in the ceiling. The two-story addition on the south side, erected 16 feet from the main building, also ran parallel with the latter. It contained on the ground floor a dining-room and wash-room for convalescents, a store-room and a dead-room; the two wards of the second story were fitted with 39 beds, and in the garret above them knapsacks, arms, etc., were stored. On the west side of this addition a round wooden structure, once an observatory, was used as a store-room. Of the two rooms over the arch, connecting the first floor of the main building with the addition on the south, one served as a dispensary, the other as a bed-room for the cooks. The two-story addition on the west side contained on the ground floor an extensive laundry and an ice-house; the second story a clerk's office, a reading-room and a store-room for bedding and hospital clothing. The yard to the west and south of the hospital covered an area of 25,336 square feet. It was pleasantly shaded by large trees, and had a gymnasium and wooden seats for the convalescents. The sinks were at the west end of the lot, 132 feet from the house.

Hospital, Newark, N. J., *condensed from a report of Medical Inspector* Geo. H. Lyman, *U. S. Army, August*, 1864.—The hospital buildings are five in number, two near Centre street and three about a quarter of a mile distant, near Market street. The Centre street establishment is compressed between the New Jersey railroad, which passes along its front and only about ten feet distant on one side, and the Passaic river on the other; from the latter it is separated only by the width of the wharf. The main building next the railway is of brick, 131 × 71, four stories high, with a basement, eleven feet in height, two-thirds under ground. Behind this building is a narrow street or right of way which separates it from the second building. This is an irregular structure, forming wards from 100 to 130 feet long and from 31 to 35 feet wide. Wooden bridges above the street connect the second and third stories of the two buildings, and outside staircases have been built from the upper stories to the ground for escape in case of fire. The Market street building, also on the line of the railroad, is of wood, three stories high, and with a deep basement which gets light from the sides and rear, the ground sloping rapidly from the front. The building is 100 × 50; in its rear a long, roughly built shed, 150 × 24 × 30, has been adapted for use as a ward; a third building, a long narrow shed 126 × 6, is divided into a store-room, knapsack and lumber-room.

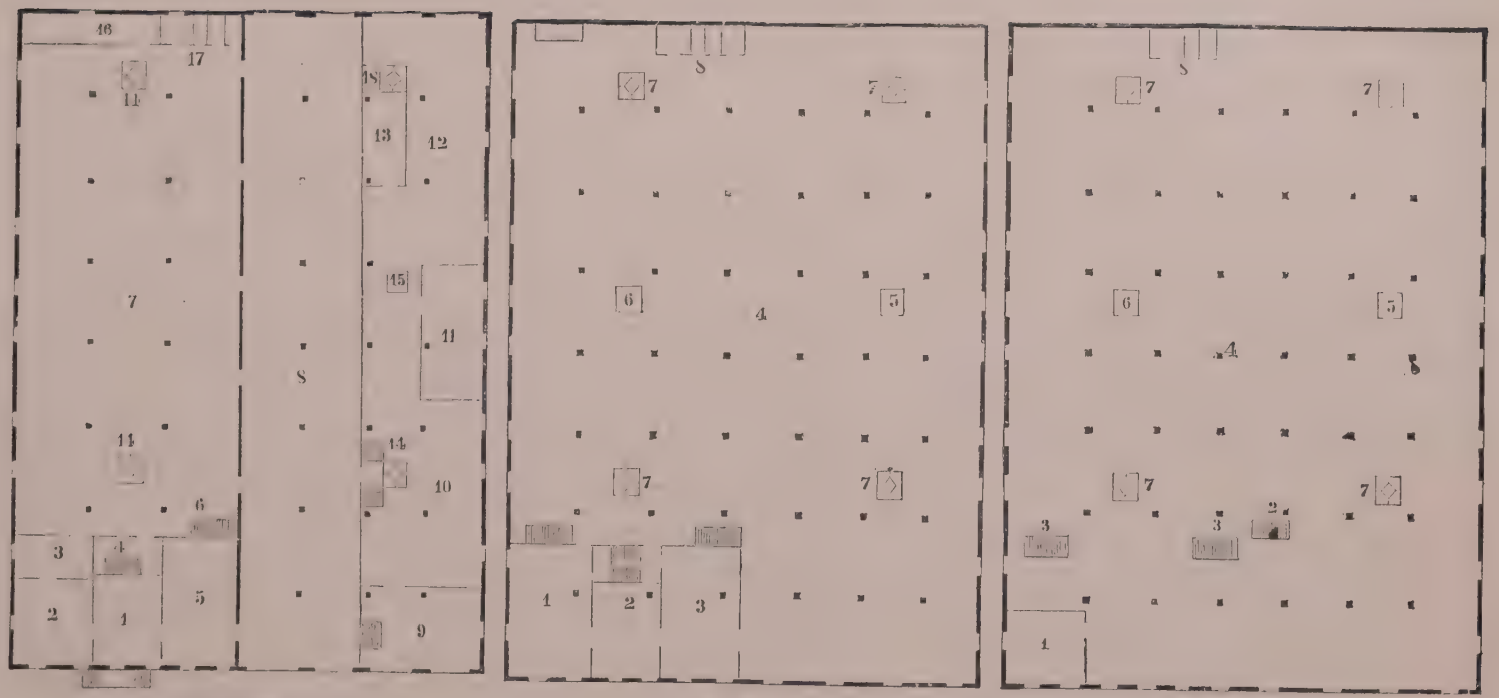
The accommodation for officers is very limited, most of them living in the town. In the Centre street buildings the cooks and nurses sleep in the wards; in the Market street branch the cooks have separate and comfortable quarters. Patients obtain an average of 64 superficial and 696 cubic feet. There are thirteen wards occupied by 1,033 beds. The largest wards, 126 × 68, are too wide for good ventilation without a central shaft. The offices, scattered conveniently about the hospital, are sufficient in size and number. The mess-hall at Center street, in the basement of the main building, 128 × 63 × 10, is very imperfectly lighted, being mostly under ground: a kitchen space, 73 × 17, is separated from the mess-hall by a wooden screen. The basement has a stone floor, with an open drain on one side terminating outside in the sewer. The kitchen at Market street, 56 × 19 × 16, occupies one end of the large well-lighted basement, the remainder, 59 × 47 × 16, being used as a mess-hall.

The buildings are warmed by stoves and well lighted by windows on all sides, having been erected originally for factory purposes. Ventilation is good enough in summer, but unsuitable for winter,—the windows and doors are relied on. Patients near the walls are subjected to currents of cold air, and the central wards are imperfectly purified. Proper ventilating-shafts have been repeatedly recommended. The lavatories and baths are ample on each story and well supplied with water. At the Centre street buildings one-inch iron pipes are laid from the engine-room to the bath-tubs; when the tubs are filled with water steam is turned on, affording a warm-bath in a few minutes.

The outside sinks project over tide-water in the river. Water-closets of the hopper pattern are provided for each ward. Some of those at Centre street have too much odor, attributable, I have always supposed, to the condition of the sewerage beneath.

I do not think the location a desirable one on account of the noise from the constant passage of trains, the absolute want of space for exercise-grounds and the constant climbing from story to story; its only advantage is the easy access by rail and water. The construction and general arrangements are devoid of method; ventilation is imperfect: the wards are too large for any feasible plan of perfect ventilation, and the mess-hall at Centre street is gloomy and unpleasant. However, as the hospital has been fitted up at considerable expense and is much needed, I have always recommended that it should be continued.

Broad and Cherry Streets Hospital, Philadelphia.—The building was originally a railroad depot. It contained 580 beds for patients and 40 for attendants. The first floor was fitted up for 78 patients, the second for 234,



HOSPITAL, BROAD AND CHERRY STREETS, PHILADELPHIA, PA. *First floor*—height 12 feet 8 inches: 1, Entrance-room; 2, Office; 3, Dispensary; 4, Stairs; 5, Steward; 6, Stairs; 7, Ward, 51 × 110 feet; 8, Dining-hall, 27 × 118; 9, Stores; 10, Kitchen; 11, Coal; 12, Wash-room; 13, Drying-room; 14, 14, 14, Flues; 15, Dumb-waiter; 16, Nurses' room; 17, Bath-room, sink and water-closet; 18, Water-closet. *Second floor*—height 11 feet 4 inches: 1, Resident physicians; 2, 3, Nurses; 4, Ward, 118 feet 6 inches by 107 feet 8 inches; 5, Dumb-waiter; 6, Ventilating-shaft; 7, Flues; 8, Bath-room, sink and water-closets. *Third floor*—height to roof-girders 10 feet 5 inches: 1, Nurses; 2, 3, 3, Stairs; 4, Ward, 118 feet 6 inches by 107 feet 8 inches; 5, Dumb-waiter; 6, Ventilating-shaft; 7, Flues; 8, Bath-room, sink and water-closets.

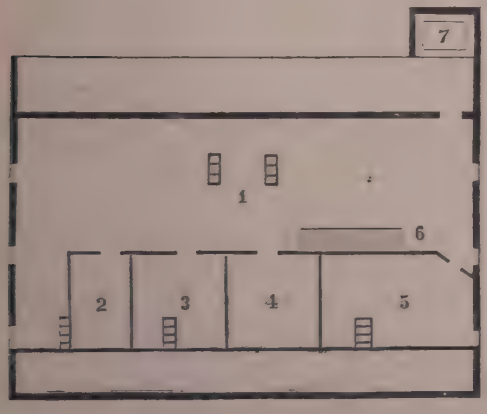
the third for 248. The air-space measured 577,608 feet, giving an average of 931 feet to each occupant. The ventilation was considered good. Inflow was by the doors and windows, outflow by a large shaft terminating in a louvered turret. The building was heated by stoves. The plans on the opposite page show the details of its arrangement.

Hospital, Mound City, Ill., *condensed from a report of Surgeon* E. C. Franklin, *U. S. Vols.*—This hospital was established in September, 1861. It is situated on the west bank of the Ohio, about six miles above Cairo, on the first high ground above the mouth of the river and two miles below the grand chain, a bar which at low water seriously interferes with navigation. It comprises a block of twelve brick houses, three stories high, 265 feet front, 75 feet in depth and with wings extending 95 feet to the rear. These buildings, intended for business purposes, were unfinished when first taken possession of by the Government; the expenditure of much money and labor was necessarily required to put them in proper condition. Communications throughout the second and third stories were opened, making a continuous passage from one extremity of the building to the other. Piazzas 12 feet wide were constructed along the whole length of the building in the rear, one for each story, to afford a protection and pleasant promenade to the patients. All the business of the wards is conducted in the rear of the building by means of these piazzas. They lead to the privies, which are removed sufficiently to prevent any unpleasant odor gaining access to the wards. The stairways leading to the several wards were enclosed and doors placed at each landing. In every alternate ward the stairways were closed as unnecessary, and the others were rebuilt with a less abrupt rise as more suitable for hospital purposes. Partitions were constructed for business purposes as the wants of the hospital indicated, and many additions made and alterations planned for the comfort of patients and economy of administration. An elevator for carrying sick and wounded patients from the ground floor to either story was one of the important improvements introduced. The first floor is occupied by the dispensary, offices, kitchens, dining-room, chapel, store-room, attendants' sleeping-room, etc., and by three wards. The second story has ten wards and the third story twelve. All these wards are of like dimensions, 75 × 22 feet, except the two end wards of the second story, which are 44 feet wide, and one ward in the third, which is 65 feet long. Most of these wards are lighted only from the ends, having dead walls on both sides. They are warmed by coal-stoves and lighted at night by coal-oil lamps. Sewers were constructed from the main privy-vault to the river, and branch sewers from the side privies to the main. Water is supplied by steam-power to every part of the building, and bath-room facilities have been provided.

The pest-ward, situated about 300 feet from the general hospital, is a frame building containing 80 beds. It is used for erysipelas, rubeola and other epidemic diseases. The small-pox ward is a floating hospital, comfortably arranged for 30 patients. It is moored on the Kentucky shore directly opposite the general hospital. Attached to it is a quarantine for such persons as may have been exposed to the contagion of small-pox.

The convalescent barrack, a large and well-ventilated frame building, about one-third of a mile from the hospital, furnishes accommodation for 300 men.

The Good Samaritan Hospital, St. Louis, Mo.—This building was erected in 1859, for hospital purposes, by an association of homœopathists. It was a three-story building with lofty ceilings, a basement and attic, and was fitted up to contain 150 patients with the necessary attendants and employés. The basement walls were of stone; the remainder of the building of brick. All the doors had hinged transom-lights. The windows, 8 feet × 3 feet 3 inches, were hung with sash-weights for regulating the ventilation. The floors were laid with yellow pine, oiled with linseed oil. Each story had a fine wide corridor in the rear of the building, connected with the others by flights of stairs. These, with a yard containing some shade-trees, gave facilities for exercise. In the rear of the lot there was a two-story brick building, with a veranda on each floor, a brick stable and a temporary wood-house. Water for cooking and drinking was derived from a well; for washing, from two cisterns in the yard; for bathing, from a tank under the roof in the attic. For the plan of its construction see the accompanying figures.



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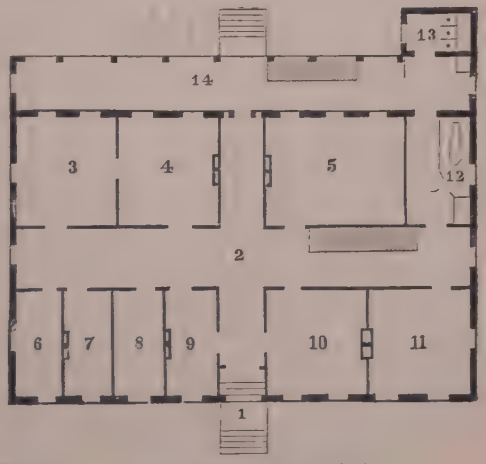
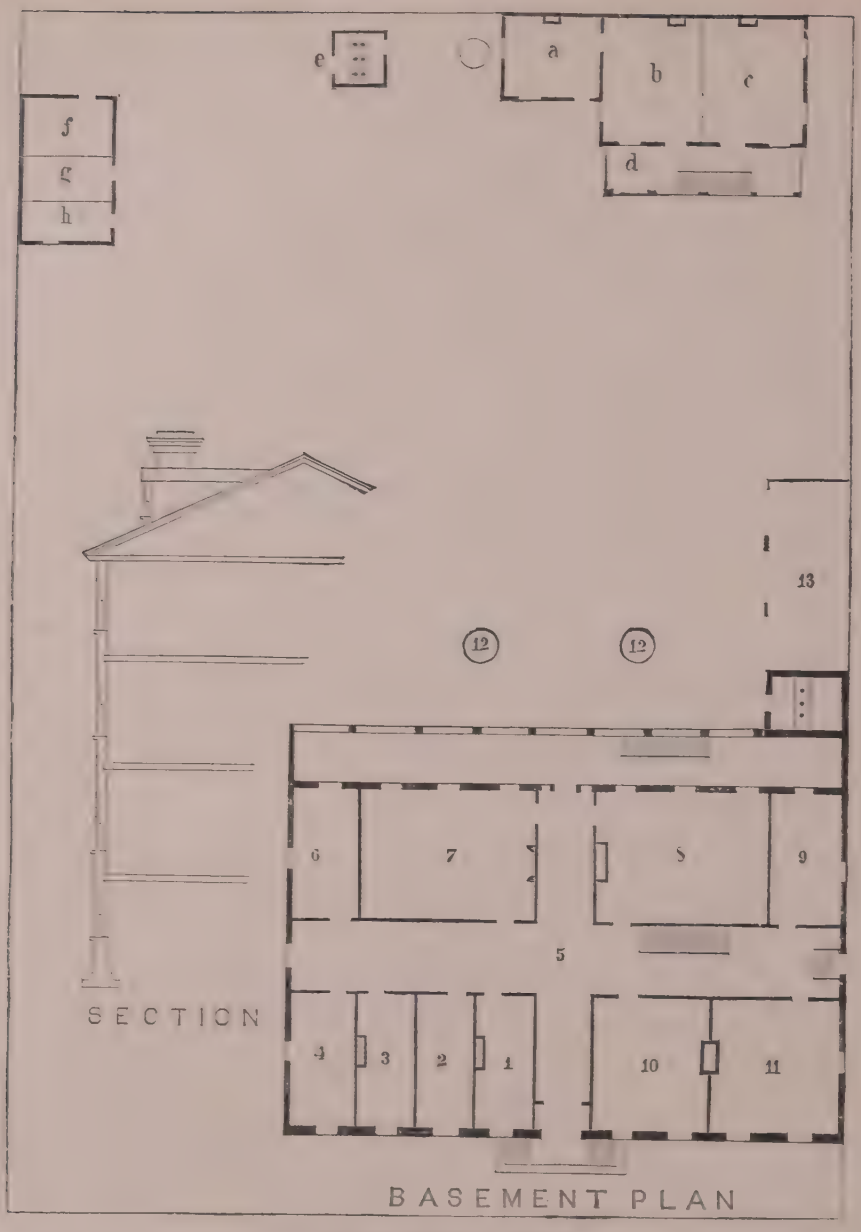


FIRST, SECOND AND THIRD FLOORS.

GOOD SAMARITAN HOSPITAL, ST. LOUIS, MO.

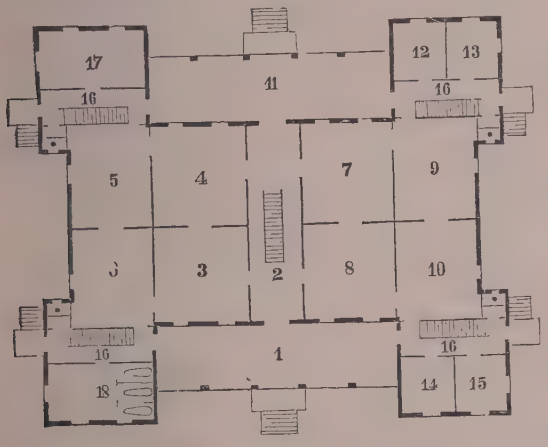
See next page for explanation.



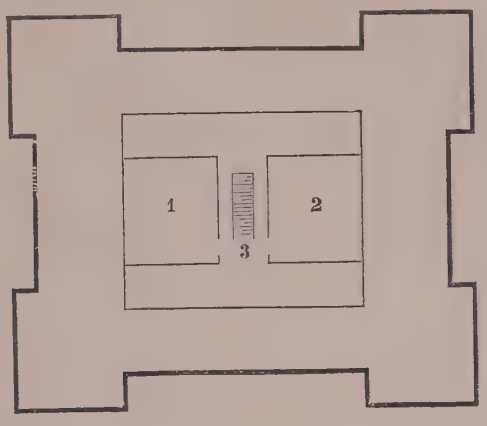
GOOD SAMARITAN HOSPITAL, ST. LOUIS, MO.

Scale [illegible] 1, Balcony. 2, Attendants'. 3, Closet-room. 4, Reception-room. 5, Hall. 6, Messroom. 7, Kitchen. 8, Dumb-waiter. 9, Dead-room. 10, Amphitheatre. 11, Steward's. 12, Chimneys. 13, Water-closets. a, b, c, Detached building at rear of lot. a, b, c, Rooms for patients. d, Porch. e, Privy. f, g, h, Stables. *First floor*—Scale [illegible]; see page 905,—height of ceiling 15 feet: 1, Entrance; 2, Hall; 3, Store-room; 4, Ward, 17 feet 4 inches [illegible]. 5, Ward 17 ft. 4 in. [illegible]. 6, Nurses' rooms. 7, Officers' dining-room. 8, Officers' parlors. 10, Ward 17 ft. 4 in. [illegible]. 12, Dumb-waiter. 13, Water-closet. 14, Porch. *Second floor*—height of ceiling 14 feet: 1, 4, Wards, 17 ft. 4 in. × 34 ft.—twelve beds; 5, Ward, 17 ft. 4 in. × 24 ft. 4 in.—nine beds; 6, Nurses' room; 7, 8, 9, Wards, each 17 ft. 4 in. × 8 ft.—three beds; 10, Surgeon's room. 13, Ward 17 ft. 4 in. [illegible]. 14, Porch. Hall-room between second and third story. *Third floor*—height of ceiling 13 feet: 6, Steward's room; 10, 11, Wards, each 17 ft. 4 in. × 16 ft. 8 in.—six beds. Hall-room between 9 and 10 is a ward, 17 ft. 4 in. × 8 ft.—three beds. *Attic*—average height of ceiling 7 feet: 1, Ward, 86 ft. 6 in × 25 ft.—thirty-two beds; 2, Nurses' room; 3, Wash-room; 4, 5, Nurses' rooms.

The MARINE HOSPITAL, ST. LOUIS, MO., was converted into a military hospital in April, 1862. It faced the south-west and was five stories high, including the basement and attic. It was flanked by four towers and had verandas on three stories, front and rear, commanding a fine view of the river and the surrounding country. The basement, one-half under ground, contained the engine-room, store-room, lamp-room, wash-room and dead-room. The engine was used for warming the house and pumping water into the tanks in the attic. The first floor contained the office, pharmacy, convalescent dining-room and kitchen, quarters, bath-rooms, steward's and nurses' rooms, kitchen and dining-room for attachés, sick-ward and water-closets. The second and third floors each contained four large double rooms and one small room occupied as wards. In the attic were the baggage and tank-rooms and two rooms of nine beds each, usually occupied by nurses and convalescents. The details may be seen in the accompanying plans.



PLAN OF FLOORS—$\frac{1}{480}$.



PLAN OF ATTIC—$\frac{1}{480}$.

FRONT ELEVATION—$\frac{1}{360}$.

THE MARINE HOSPITAL, ST. LOUIS, MO.

First-floor: 1, Portico; 2, Hall; 3, 4, Dining-rooms; 5, Office; 6, Kitchen; 7, 8, Quarters; 9, 10, Surgical wards, seven beds in each; 11, Portico; 12, Dining-room; 13, Kitchen; 14, Nurses' room; 15, Steward's room; 16, 16, 16, 16, Halls, a water-closet off the end of each; 17, Pharmacy; 18, Bath-room. *Second floor*—generally similar to first floor: 3, 4, 5, 6, 7, 8, 9, 10, Wards of seven beds each; 12, Kitchen; 13, 14, 15, Nurses' rooms; 17, Linen-room; 18, Ward of four beds. *Third floor*—generally similar to second: 17, Ward of four beds; 18, Medical cadets. *Attic:* 1, 2, Wards, nine beds each; 3, Hall.

MASON HOSPITAL, BOSTON, MASS.—A 30 × 50, four-story brick residence, accommodating 60 patients,—20 on the first floor, 16 each on the second and third floors and 8 on the fourth or attic floor. Hall-rooms were used for the steward, clerks and nurses: the cooks and other employés were quartered outside the building. The basement contained the dispensary, kitchens, store-rooms, etc., the laundry being in an L behind. This hospital had all the advantages of a city mansion, a good site and quiet neighborhood, lavatories, baths, water-closets, and an excellent system of ventilation and heating by furnace-warmed air, supplemented when necessary by open fireplaces. Medical inspectors regretted only that there was not more of it.

Frequently, when the ground in the vicinity of a building taken for hospital purposes was of a suitable character, the demand for increased accommodation was supplied by hospital tents pitched so as to form a series of elongated pavilions. Thus the STONE HOSPITAL on Meridian Hill, Washington, D. C., consisted of an old mansion and its outhouses, which afforded offices and quarters for the medical staff and their subordinates, with facilities for cooking and laundry work and beds for about 74 patients: but the capacity of the establishment was increased to 170 beds by the presence of 16 of the regulation hospital tents, each fitted for six patients. The DOUGLAS HOSPITAL in the same city, opened in January, 1862, comprised three contiguous mansions and an aggregation of tent-wards. The spacious rooms, lofty ceilings and many conveniences of the Douglas buildings are said to have made this hospital one of the best in Washington of those not specially constructed for the shelter of the sick. At a later period the tent-wards were replaced by two long wooden pavilions.

But before the need for special military hospitals in our large cities had received a practical recognition, the movements of large bodies of troops in West Virginia, and the want of available buildings in that part of the country, led Ass't Surgeon W. A. HAMMOND, U. S. Army, to urge upon Ass't Surgeon J. LETTERMAN, U. S. Army, then Medical Director of the Department, the advisability of constructing ridge-ventilated wooden sheds for hospital purposes. The first of these, built at Parkersburg, Va., under the supervision of Ass't Surgeon E. S. DUNSTER, U. S. Army, measured 130 × 25 × 14 feet to the eaves, and was divided by transverse partitions into four wards of twenty beds each. Speaking of a similar building at Grafton, Va., Ass't Surgeon LEWIS M. EASTMAN, in a report dated April 1, 1862, says:

It is very difficult, in ordinary buildings used as hospitals, to secure ventilation without exposing the inmates to injurious draughts of air. This difficulty is avoided in the building now being constructed in accordance with the orders of Ass't Surgeon LETTERMAN, U. S. Army, by means of "ridge ventilation," which keeps the air constantly pure without exposing anyone to unpleasant or dangerous draughts.

Shortly afterwards similarly ventilated buildings were constructed at New Kirk, Va., Gallipolis, Ohio, and Clarysville, Md. The figure which follows represents a side view of one of seven erected at the last-named point, concerning which Surgeon GEORGE H. OLIVER, U. S. Vols., reported Oct. 1, 1862:

These buildings, though well adapted for use in warm weather, do not afford sufficient protection from the cold of winter for sick and wounded men. The declivity of the ground causes them to stand high: the sides are of rough upright boards with crevices not battened to their full height; and the ridge ventilators having no sash or shutter to close, the cold wind and snow penetrate to an extent unbearable by the patients.

SIDE VIEW OF ONE OF THE CLARYSVILLE PAVILIONS.

The inauguration of the Peninsular campaign in the spring of 1862 filled the hospitals of Washington with the sick men of the moving army: but this same military undertaking occasioned the vacation of a number of barrack buildings, particularly near Washington

and Baltimore, by calling into the field the troops that had hitherto occupied them. Advantage was taken of this to relieve the overcrowded condition of the hospitals already in existence by hastily fitting up the vacated shelters for hospital purposes. These establishments were intended merely as makeshifts, but the demand for hospital accommodation continued so steadily in advance of the supply that many of these retained their status of general hospitals to the end of the war.

In few, if any instances, did the buildings constructed as quarters for troops give satisfaction as hospital wards. Sometimes even the site was undesirable. Generally the grounds were found to be in bad sanitary condition. Much refuse and filth had to be carried away. Frequently the surface had to be drained and shallow basins brought to the general level by deposits of gravel. The water-supply and the disposal of excreta and other refuse came up for consideration, as these barracks were seldom so far within the limits of a city as to have full participation in the municipal conveniences. Suitable arrangements had to be provided for kitchen and laundry work, and store-rooms of a more or less special character were required. But the essential change involved the adaptation of the former company dormitories for use as hospital wards. These dormitories were generally long, low and narrow one-story frame buildings, roughly constructed, imperfectly lighted, frequently with windows only on one side, unventilated save by the doors, windows and unauthorized crevices, and fitted up with single or double bunks in two or three tiers. In many instances the rooms were too narrow for a line of beds along each wall, the ceilings too low to give adequate air-space, and the board floors so imperfectly joined that foul exhalations rose through the seams from the unventilated soil. Generally these quarters were set directly on the ground, and not unfrequently the earth had been banked up against the lower part of the outer aspect of the walls to prevent the inflow of cold air through chinks in the flooring. In some of the barracks the buildings were two stories in height, with marked defects in the ventilation of the lower rooms added to all the objectionable features of the one-story buildings.

To adapt these to hospital purposes the earth was cleared away from the walls and provision, if possible, made for some air-movement beneath the buildings. The floors were repaired: additional windows were inserted. The ridge was laid open for ventilation in summer and louvered exits were provided for winter use, with inlet openings near the stoves. Ventilating apertures were made in the walls, and the unauthorized crevices closed by laths and plaster in the interior and weather-boarding on the exterior. The lower rooms of two-story barracks were connected with the ridge by ventilating shafts, but these were insufficient, in the absence of some more active method of inducing a current than aspiration without and an increased temperature within. It does not appear that the heat of the flues was utilized in any of these instances.

Besides these defects in the barrack buildings, their arrangement or relative position on the camp-ground was seldom the most appropriate for an aggregation of hospital pavilions. They were either so detached as to greatly augment the difficulties of administration, or so massed around a central point as to interfere with their ventilation. Thus at Camp Dennison, Ohio, where the pavilions were arranged in a single line with wide spacing between adjacent buildings, the ward on the right of the line was separated from that on the left by a distance of nearly a mile. At Patterson Park and McKim's, Baltimore, Md., and the Campbell Hospital, Washington, D. C., they were placed lengthwise along the sides of a hollow square or oblong, an arrangement which interfered materially with the ventilation of

the leeward sides. The plan of the CARVER HOSPITAL, Washington, D. C., was perhaps the best of any in this respect. The buildings formed the sides of a rectangular figure; but as their gables abutted on the enclosure the latter was open to perflation through the interspaces between adjacent pavilions. The following are submitted as illustrations of barracks converted to hospital purposes:

CLIFFBURNE HOSPITAL, WASHINGTON, D. C.—*Extract from a report of Ass't Surgeon* J. S. BILLINGS, *U. S. Army*.—The barracks had been previously occupied by the 5th U. S. Cavalry. I found the buildings and grounds in an extremely filthy and dilapidated condition,—no drainage whatever, no sinks, no water within half a mile. Five buildings, the old barracks, were first fitted up, additional doors and windows being inserted and the system of ridge ventilation adopted. Apertures were also cut in the sides of the buildings near the floor, and every part well whitewashed inside and out. A thorough system of drainage was instituted and three wells dug and fitted with large wooden pumps. These, however, are insufficient, and one team is in constant use bringing water from a distance. A new building for kitchen and mess-room was built, 200 feet in length and 15 in width, and Ball's patent range placed therein, capable, as found by experience, of cooking easily for 1,000 persons. Wooden privies were constructed, eighteen in number, and so light as to be readily removed to new trenches when necessary. Fifteen hundred loads of offal were cleared from the grounds and vicinity of the buildings, and 800 loads of gravel advantageously disposed in various situations. One hundred and five hospital tents were pitched, framed and floored, and two additional buildings fitted up, making the number of beds in the hospital one thousand. A bath- and wash-room 50 feet in length was also built, and four tubs are in constant use. Three washing-machines are used in the wash-room—and both hot and cold water freely supplied. An apothecary shop, store-room, clothing-rooms, knapsack-room, dead-house, guard-house, stable, etc., were also fitted up. Fifteen Sisters of Charity are employed as nurses; they prepare all extra articles of diet. Of their services and conduct I can speak only in terms of the highest praise.

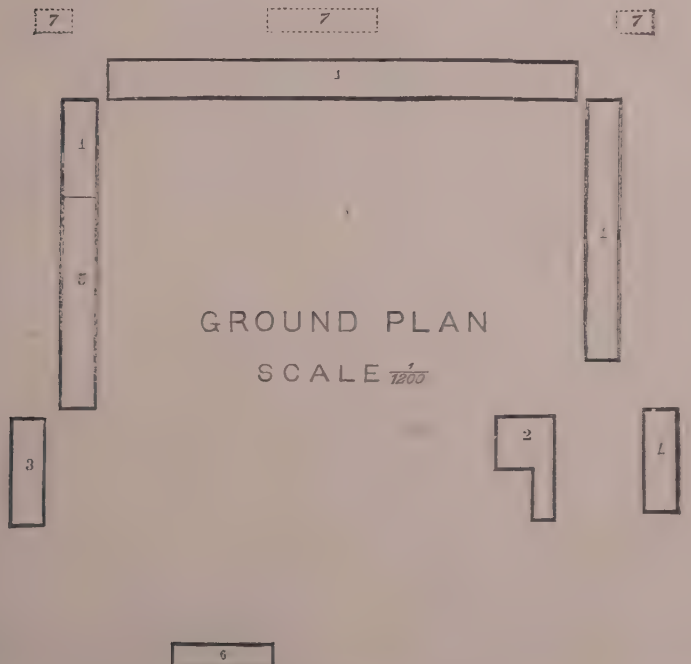
CAMP DENNISON, OHIO, was situated sixteen miles from Cincinnati, on a plateau between the Little Miami river on the east and south and a crescentic range of hills on the north and west. About 150 acres of level or gently rolling ground were fenced in. One-half of this enclosure presented green sward, shade-trees, plots of flowers, water-jets, plank and gravel walks and graded and gravelled roadways and drives; the remainder was cultivated as a hospital garden and yielded an abundance of fresh vegetables. The buildings, like all those originally constructed as quarters for troops, were too small and narrow for hospital use; their floors were not sufficiently raised from the surface, and fault was found by medical inspectors with the lighting and ventilation; the smaller barrack-rooms had windows on one side only. The arrangement of the buildings rendered the administrative duties extremely difficult. The pavilions used as wards, dining-rooms, etc., were in line, their long axes parallel, with an avenue 40 feet wide between adjacent buildings. Their number was such that the line was about a mile long. There were fifty pavilions each $120 \times 25 \times 11$ feet, and seventeen each $60\frac{1}{2} \times 15\frac{1}{2} \times 11$ feet. To adapt these for hospital use they were lathed, plastered and furnished with ridge-ventilation and air-inlets at the floor-level by the side of the stoves. Of the fifty pavilions five constituted a division of the hospital; but only four of these were used as wards, the fifth having done duty as the dining-room of the division and as store-rooms, etc., pertaining to it. Of the seventeen smaller pavilions six were occupied as quarters for the Veteran Reserve Corps on duty at the hospital, one by the band, nine by convalescents and one as a dining-room. By the side of each of the fifty pavilions was a set of quarters each $21 \times 14 \times 10$ feet, for attendants; and in rear of each was a building $21 \times 14\frac{1}{2} \times 10$ feet, originally the kitchens of the company quarters. A similar building was found in rear of nine of the seventeen smaller pavilions. In each division of the hospital only two of these rear buildings were used as kitchens—one for the general, the other for the special diet of the division to which they belonged; the others were applied to use as store-rooms, work-shops, etc. To the right and about eight rods in front of the line of hospital pavilions was a two-story building, formerly a granary or barn, which, having been comfortably fitted up, constituted one of the divisions of the hospital. It afforded three wards on the ground floor $22 \times 25 \times 9$ feet, $24 \times 29 \times 9$ feet, and $90 \times 27 \times 9$ feet, and two wards on the second floor $53 \times 27 \times 7$ feet and $59 \times 26 \times 7$ feet; a wing to this main building accommodated the medical officer of the division, the attendants, cooks, etc., and gave ample room for the kitchen and dining-room. About a hundred hospital tents pitched in pavilion wards added to the capacity of the hospital. Besides these buildings, which formed the ward shelters, a number of others were found in connection with them or constructed subsequently to the adaptation of the barracks for hospital purposes. These were used as quarters for medical officers and attachés of headquarters, subsistence and other store-rooms, knapsack-rooms, dead-house, stables, etc. One, situated near the centre of the line of pavilions, was used as a chapel, library and reading-room. A steam laundry was established in one corner of the grounds. The water-supply was taken from a mill-race derived from the Little Miami river. A steam-pump, driven by an engine of twenty horse-power, raised the water about eighty feet to a well-protected reservoir 43 feet in diameter and 15 feet in depth, from which it was distributed to the various buildings. Its quality was not satisfactory, as the drainage of the whole camp passed into the stream *above* the point from which it was taken. Hot and cold water was supplied to each ward. At one end of each of the large pavilions were two rooms, one on each side of the doorway. These were well fitted up as bath-rooms and water-closets. The sewerage system was in good order. Deep vaults, six or eight rods in rear of the quarters for officers and attendants, were used as sinks by convalescents and others.

MCKIM'S MANSION, BALTIMORE, MD.—The barracks at this mansion, in the northern suburbs of the city, were originally intended as temporary shelter for troops. They consisted of three long two-story buildings of rough boards, with no interior finish. One was 150 feet long, another 175 feet and the third 200 feet. All were 22 feet wide,

with a height of 7 feet 10 inches in the first-floor rooms and of 7 feet to the plate and 17 feet to the ridge in those of the second floor. They were built close to the ground, the latter in some parts having been dug out to remove irregularities. The floors were coarsely joined, leaving interstices that permitted small fragments of refuse matter to drop from the upper to the lower wards or from the latter to the unventilated soil beneath. Louvered turrets were provided for the ventilation of the upper rooms. Small wooden flues, 8 to 12 inches square, passing from the first-floor rooms to the ridge, failed to induce the intended air-movement. These buildings formed three sides of a parallelogram, the remaining side of which was filled in with tent-wards. Stoves were used to warm the wards. Water was derived from the city supply, but it was so scanty that only two bath-tubs were in use and no water-closets.

END ELEVATION

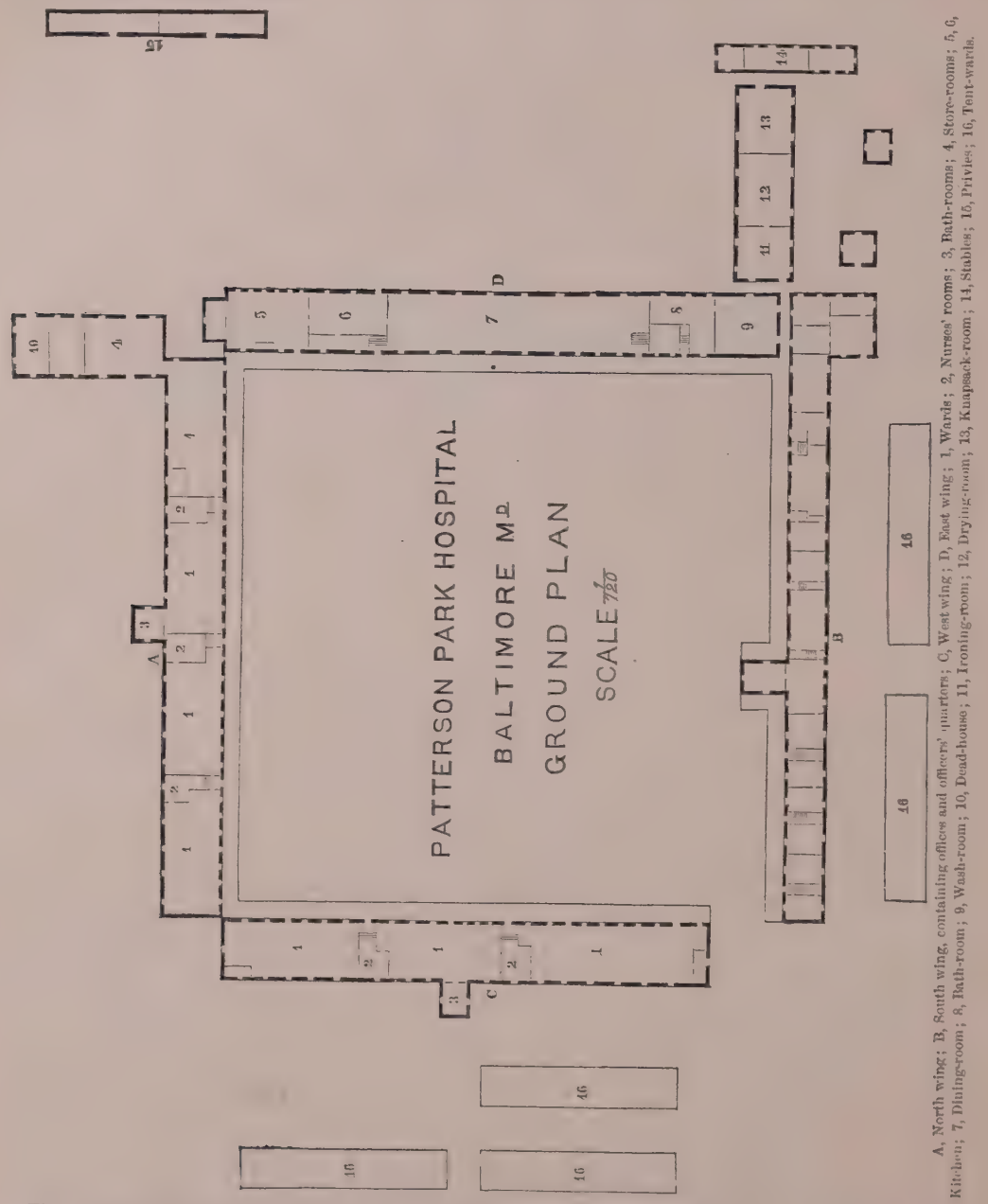
SIDE ELEVATION OF WARD
SCALE $\frac{1}{360}$



HOSPITAL, M'KIM'S MANSION, BALTIMORE, MD.

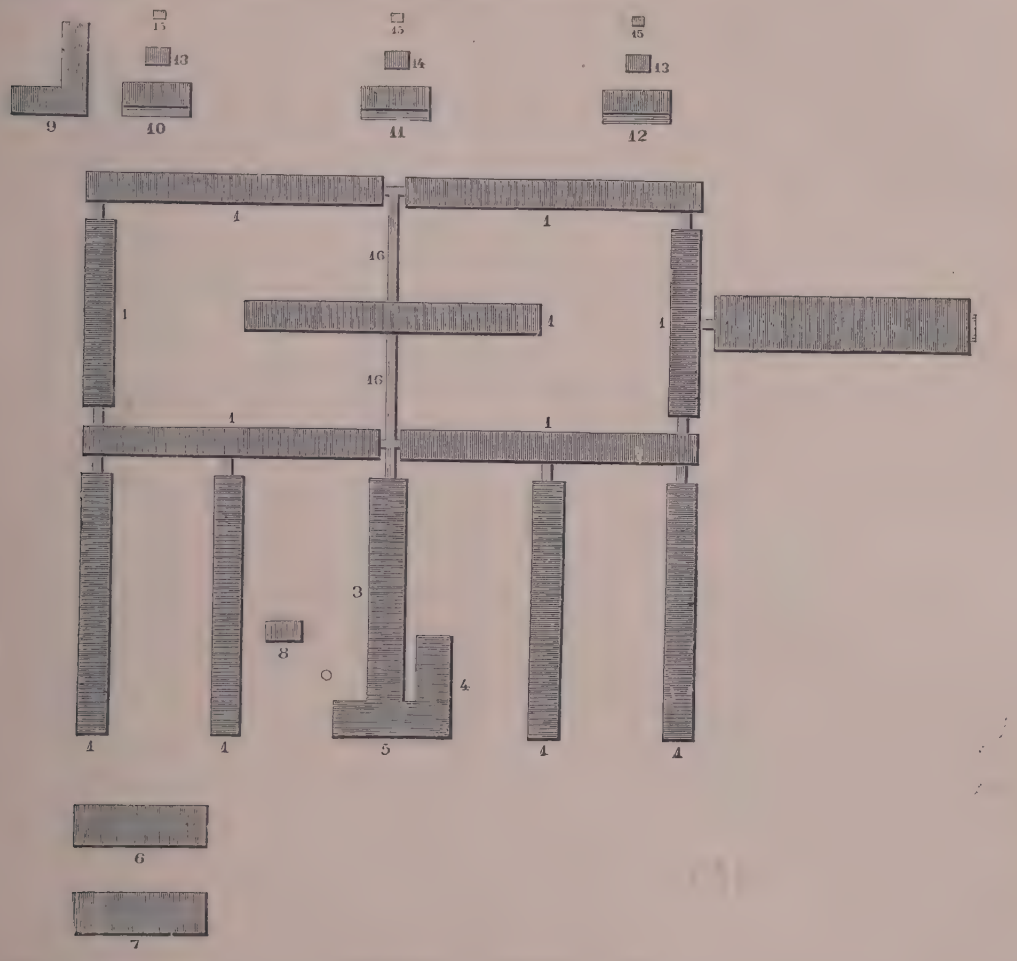
The buildings, except that marked 2, are two-storied wooden barracks [illegible]. Water-closets [illegible] house; 3, kitchen; 4, the first floor, [illegible] quarters on the second; 4, Laundry and drying-room on the first floor, quarters [illegible] second; 5, Dining-room on the first floor, ward on the second; 6, Guard-house; 7, Sinks.

PATTERSON PARK HOSPITAL, BALTIMORE, MD.—The barracks at Patterson Park were converted to hospital use in April, 1862. They consisted of four long two-story buildings arranged in the form of a hollow square. Each was 200 × 22 feet, the lower rooms 7½ feet high, the upper 12 feet; a two-story veranda ran along the sides facing the enclosure. In other respects the buildings were similar to those at the McKim mansion. They afforded space for seventeen wards, eight on the lower floor and nine on the upper, each about 50 feet long, enclosing a total of 184,800 cubic feet, or an air-space of 434 feet to each of the 426 beds at one time contained in them. Further details are shown on the ground plan submitted below.


PATTERSON PARK HOSPITAL
BALTIMORE MD.
GROUND PLAN
SCALE 1/20
A, North wing; B, South wing, containing offices and officers' quarters; C, West wing; D, East wing; 1, Wards; 2, Nurses' rooms; 3, Bath-rooms; 4, Store-rooms; 5, 6, Kitchen; 7, Dining-room; 8, Bath-room; 9, Wash-room; 10, Dead-house; 11, Ironing-room; 12, Drying-room; 13, Knapsack-room; 14, Stables; 15, Privies; 16, Tent-wards.

The CAMPBELL HOSPITAL, WASHINGTON, D. C., on the northern outskirt of the city, near the terminus of Seventh street, consisted of long, low, narrow buildings of rough boards, originally used as barracks for cavalry. Six of these enclosed an oblong space having two buildings on each long side and one on each short side of the enclosure. In its centre was a seventh building with its long axis parallel to that of the oblong; these were all used as wards. Projecting perpendicularly from the two buildings, forming one of the long sides, were five buildings, that in the centre being used as a dining-room and kitchen and the others as wards. Projecting similarly from one of the short sides was the

building used for administration purposes. There were thus eleven barrack-wards having an aggregate capacity of six hundred beds. Ridge ventilation was introduced when the barracks were turned over to the Medical Department. Ten tent-wards of fifty beds each were subsequently added. The arrangement of the buildings constituting this hospital may be readily appreciated by a reference to the plan submitted. This establishment was better supplied with water than the other converted barracks in the vicinity of Washington,—Potomac river water was distributed to the wards. Waste-water was carried off by drains to the sewers. Every alternate ward had a water-closet and bath-room, and the sinks for convalescents were kept clean by a running stream.



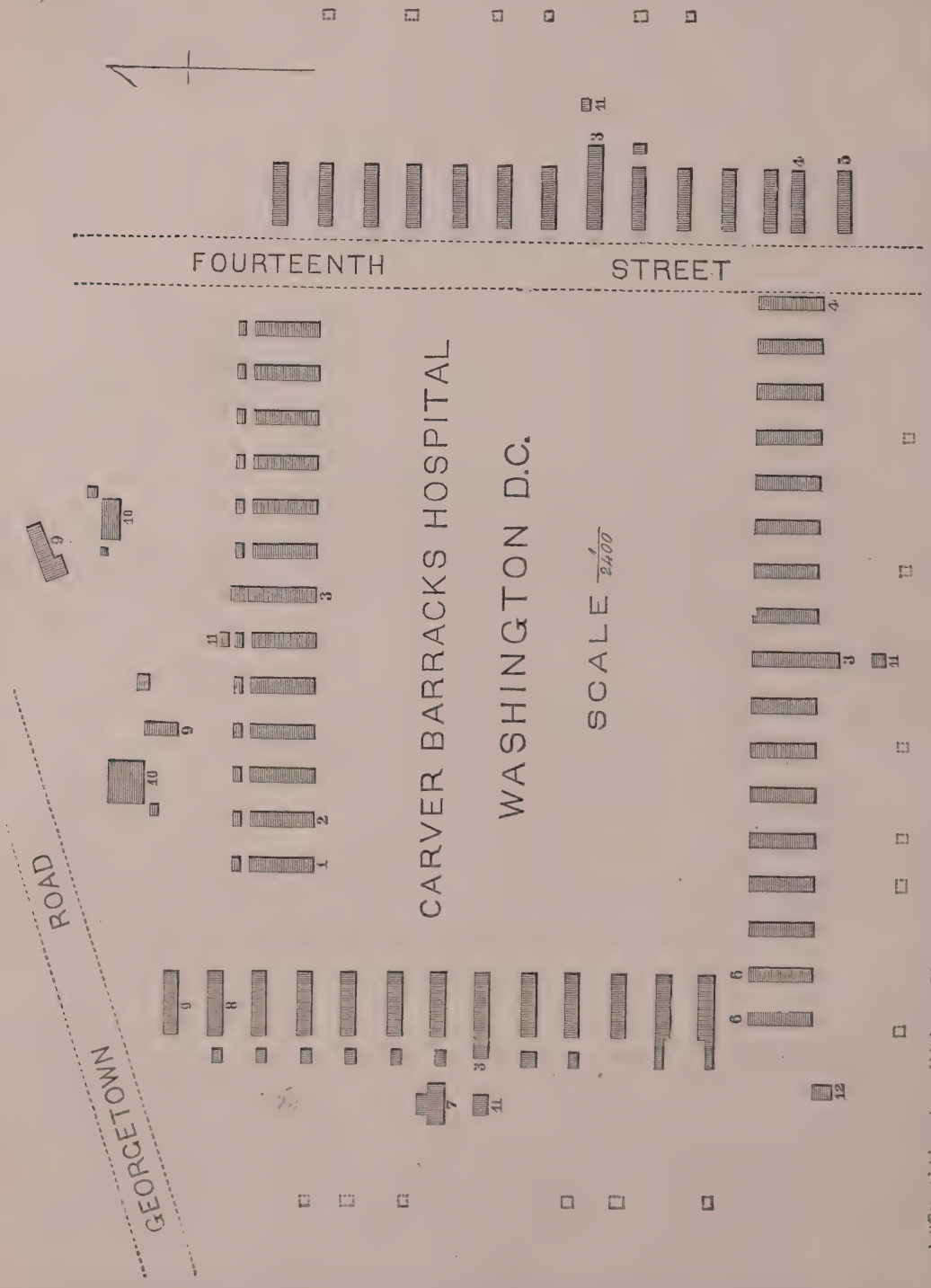
CAMPBELL HOSPITAL, WASHINGTON, D. C.—$\frac{1}{1200}$.

1, 1, 1, 1, Wards; 2, Administration building; 3, Dining-room; 4, 5, Kitchens; 6, Store-house; 7, Stable; 8, Coal-house; 9, Knapsack-room; 10 and 11, Nurses' quarters; 12, Guard; 13, 13, Negro quarters; 14, Dead-house; 15, 15, 15, Sinks; 16, Covered way.

The Carver Hospital, Washington, D. C., was situated on Meridian Hill, about two miles north of Pennsylvania avenue. Its area comprised fifteen acres, having an average height above the Potomac of 128 feet and a gradual descent in all directions. Mount Pleasant Hospital was on the northeast, about an eighth of a mile distant: Columbian College Hospital adjoined it on the south; in other directions the neighboring surface was unoccupied. The buildings were arranged in a parallelogram, measuring about 1,500 feet from east to west and 1,000 feet from north to south. The wards, 43 in number, were separated from each other by a distance of 40 feet; they were 80 × 16, with a height of 8 feet at the side and 10½ at the ridge, having a capacity of 11,840 cubic feet and containing usually about 18 beds. These buildings were constructed of battened planks, with felt roofs but no ceiling; they were whitewashed inside and out. Each had five windows and as many doors. They were ventilated along the ridge, and had a louvered air-shaft for winter use, with openings for inflow within the jackets of the stoves, and ventilating slides 12 inches square on the sides and ends of each building at the floor-level. The floors were raised about ten inches from the ground. The arrangement of these wards is depicted on page 914.

At a later date a building 100 × 40 feet and two stories high was erected in the centre of the parallelogram as quarters for medical officers and stewards, dispensary, store-rooms, etc. The kitchens were reduced in number to four,—two for convalescents, one for special diet and one for stewards and female nurses. A large number of tent-

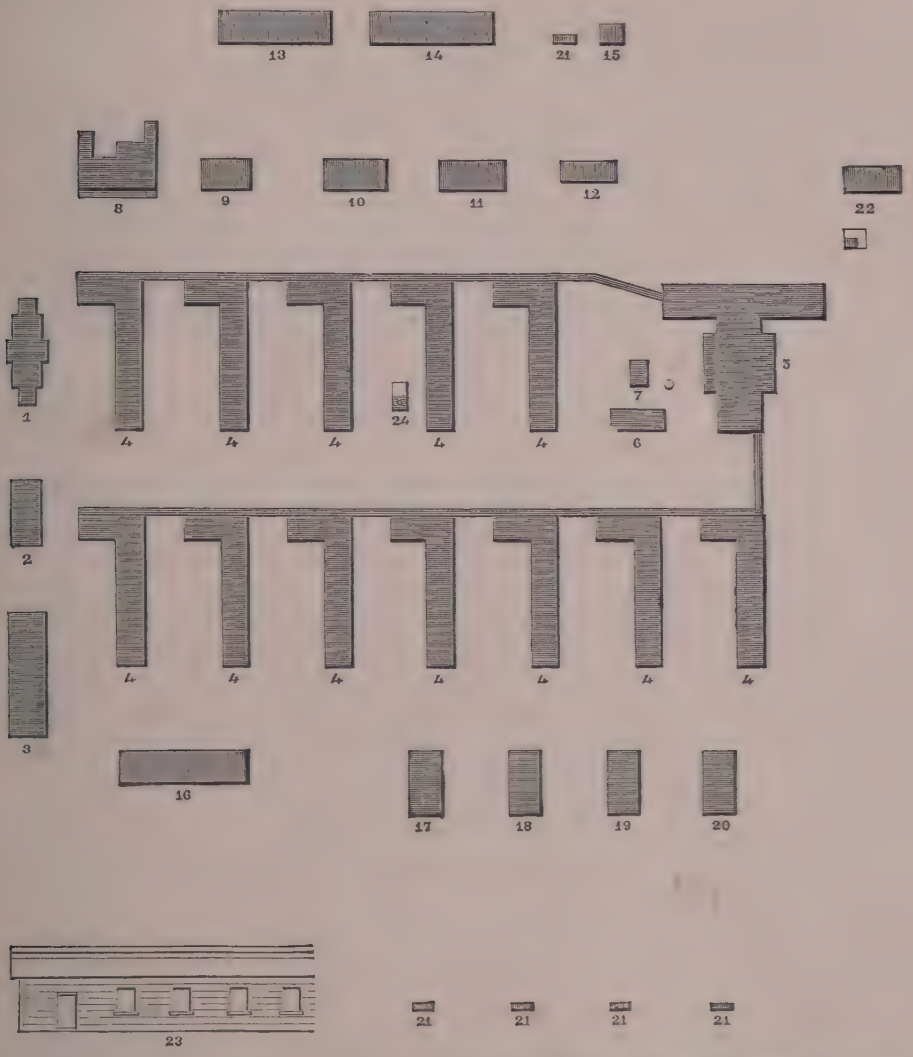
wards added to the capacity of the hospital; these were well elevated from the ground by plank flooring. Water was pumped from wells on the Mount Pleasant grounds and distributed to the kitchens from a tank near the administration building; but the ward supply continued to be delivered by a water-cart, and dry-box sinks were in use to the end. Waste-water was conveyed by pipe-drains to a neighboring gully.



1, Office, cadets' quarters and kitchen; 2, Dispensary and stewards' quarters; 3, 3, 3, 3, Dining-rooms for patients; 4, 4, Officers' quarters; 5, Guard; 6, 6, Attendants; 7, Commissary store-house and ice-house; 8, Knapsack-house; 9, 9, 9, Store-houses; 10, 10, Stables; 11, 11, 11, 11, Bath-houses with a pump near each; 12, Dead-house. The buildings in the parallelogram not otherwise designated are the wards of the hospital. The small buildings in the rear of the wards are chiefly kitchens. Those surrounding the barracks at a still greater distance are the privies.

The Emory Hospital, Washington, D. C., was situated near the Eastern Branch, on the plain east of the Capitol. The buildings, originally constructed for a cavalry barracks, had all the objectionable features of those in

use at the CARVER HOSPITAL, but in an aggravated degree. They were too low and too narrow, built directly on the ground, with the earth banked up against their walls as high as the floors. Large interstices between the coarse broad flooring-boards permitted unwholesome exhalations from the confined soil beneath to rise constantly into the wards. The water-supply was pumped from wells into a central tank. The wards, 12 in number and each shaped like an L, were arranged in two rows, five in one and seven in the other. The details of their arrangement are shown on the accompanying plan:

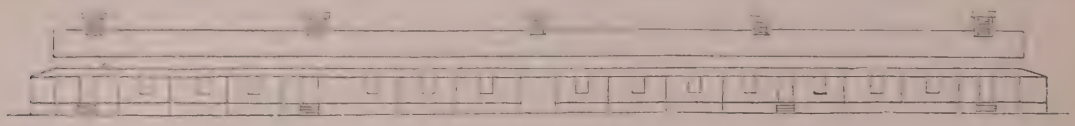


EMORY HOSPITAL, WASHINGTON, D. C.—Scale $\frac{1}{16\,0}$: 1, General office; 2, Chapel; 3, Barracks; 4, 4, 4, Wards; 5, Dining-room; 6, Kitchen; 7, Cooks' quarters; 8, Surgeon-in-charge; 9, Officers' quarters; 10, Dispensary; 11, Linen-room; 12, Laundry; 13, 14, Store-houses; 15, Dead-house; 16, Stables; 17, 18, Laundresses' quarters; 19, 20, Quarters for attendants; 21, 21, 21, 21, Sinks; 22, Guard; 23, Side elevation of ward.

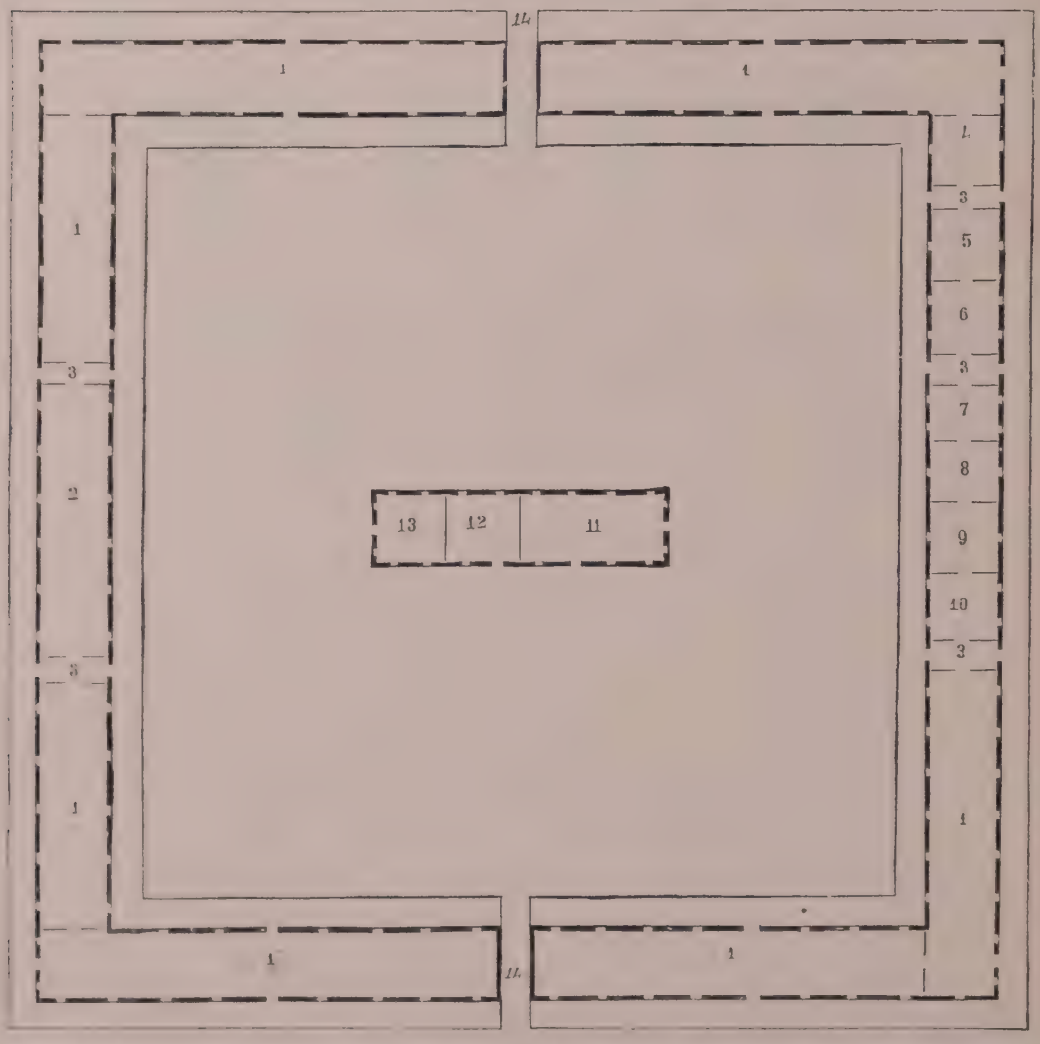
The hospital at Hilton Head, S. C., was one of the few buildings which, although constructed for hospital purposes, were modelled after the barrack system. A single narrow barrack building, more than 1,200 feet long, formed the sides of an enclosed quadrangle, the interior of which was reached by a sally-port on two opposite sides and some narrow hall- or passage-ways at points corresponding with the division of the building into wards, etc. Ass't Surgeon J. E. SEMPLE, U. S. Army, expressed satisfaction with this arrangement as facilitating administration, but it is evident that in so doing he compared it only with the same area of continuous ward-room extending lengthwise away from a medical headquarters. As

the situation of this building exposed it fully to the sea breeze, its inmates probably suffered little inconvenience or harm from the unbroken line of its outer wall.

The Hospital at Hilton Head, S. C., was organized March 1, 1862, in an old building that had been used for hospital purposes by the rebels prior to the capture of this point by the U. S. forces. But about the end of the month the patients were removed to a new building which had been specially erected as a general hospital. This was situ-



NORTH ELEVATION



Hilton Head Hospital, S.C.—1, 1, 1, 1, Wards; 2, Dining-room; 3, 3, 3, 3, Passages; 4, Office; 5, Private room; 6, Dispensary; 7, Reading-room; 8, Operating-room; 9 and 10, Surgeons' rooms; 11, Kitchen; 12, Store-room; 13, Bathing- and clothing-room; 14, 14, Gateways. The building is surrounded inside and out by a veranda indicated by the faint line.

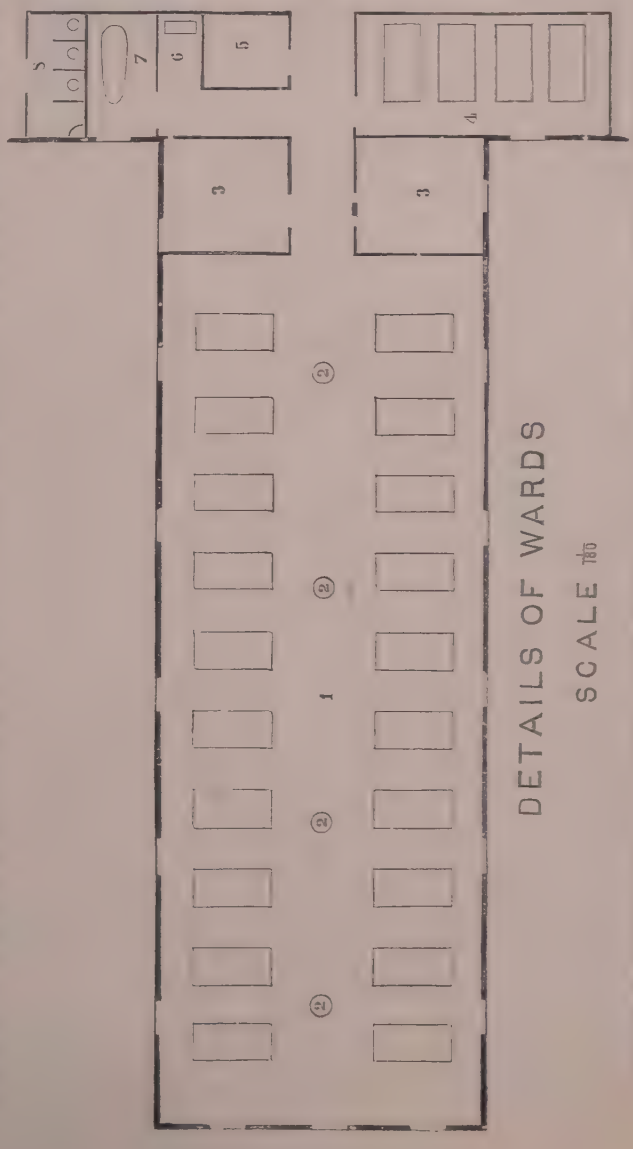
ated on the seashore on a sandy loam, formerly a cotton field. On the southwest, northwest and northeast, at a distance of about half a mile, there were large swamps with rankly growing weeds, palmetto palms, etc. A good deal of labor was expended in removing the more objectionable features of these malarial surroundings. The building, under a continuous roof, formed the four sides of a hollow square, constituting an enclosed yard. Each side was 325 feet in length. The centre of the northern and southern sides was broken by a sally-port or carriage-way, which

divided each side into two large rooms used as wards. The west side was divided by transverse passage-ways into a central room, used as a dining-room, and two lateral wards. The eastern or seaward side contained one ward, but its larger portion was separated into small rooms as offices and store-rooms. The floors were raised about three feet from the ground, and a wide veranda afforded shelter along the exterior as well as the interior face of the building. The wards are said to have been well ventilated. In the centre of the quadrangle was a building 100 × 30 feet, containing the kitchen, a store-room and a general bath-room furnished with three tubs; a part of this was partitioned off as a knapsack or clothing-room. A house outside the quadrangle was used as officers' quarters. The laundry and dead-house were also outside the hospital area. Water was obtained from numerous wells within the enclosure. The sinks on the beach were cleaned by the tide twice a day. The ground plan is shown on the opposite page.

Early in the winter of 1861–'62 the U. S. Sanitary Commission urged upon the Government the importance of building hospitals on the pavilion principle, instead of collecting the sick and wounded in hotels and other rented buildings which were generally ill-adapted for hospital purposes. In accordance with this suggestion the JUDICIARY SQUARE and MOUNT PLEASANT hospitals were commenced at Washington, D. C., in the course of the winter, and finished for occupation in April, 1862. The description of one applies to both.

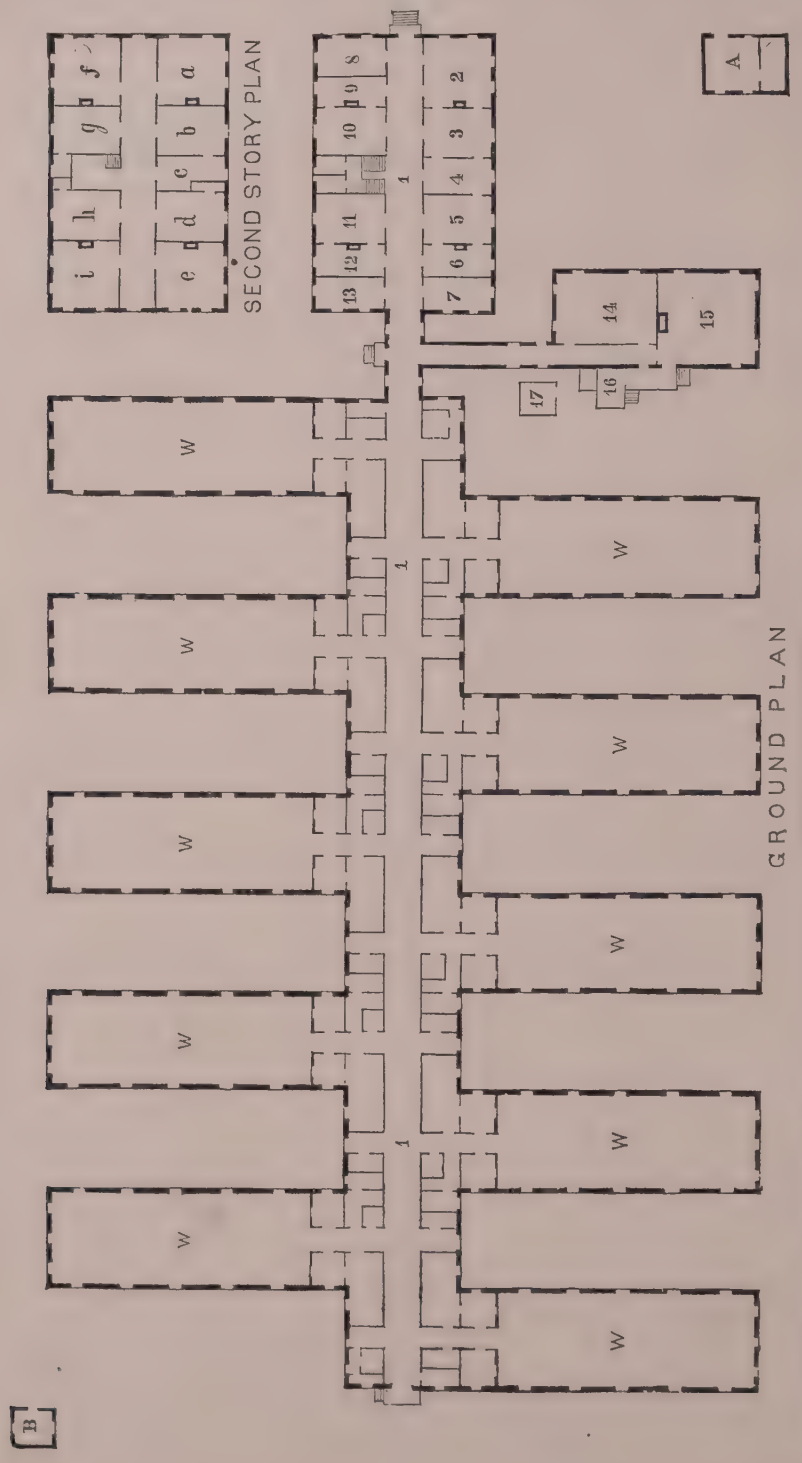
The hospital was raised on cedar posts about three feet from the ground, the underlying space being closed in but ventilated by many apertures. An administration building of two stories was divided along its middle on both floors by a central corridor ten feet wide. On the first floor were eight rooms, four on each side of the corridor, used as offices, dispensary, store-rooms and quarters of medical officers, with small store-closets on one side and a stair-way, with water-closet and bath-room under it, on the other. The second story, similarly divided, accommodated stewards, wardmasters, clerks and laundresses, etc.

The corridor of the ground floor of the administration building extended rearward throughout the whole length of the hospital, preserving a width of ten feet, and communicating on each side with the bath-rooms, water-closets and isolation wards of each of the pavilions. This corridor, with the line of small rooms on either side of it, being covered by one roof, constituted an elongated central building 32 feet wide, on each side of which, and at right angles to it, were five pavilion-wards each 84 × 28, and 12 feet to the eaves. These were separated from each other by a space equal to their own width, and the attached end of the ward on one side of the corridor faced the interspace on the other side. The details of the wards and the rooms attached to them on their corridor ends are seen on the next following page. The passage-way from the corridor to the wards had doors on one side leading into a scullery, sink, bath-room and nurse's room, and on the other into a nurse's room and a small ward of four beds intended originally for convalescents, but generally used as an isolation room for special cases not requiring absolute removal from the hospital. The water-closet, 8, on the adjoining figure, as may be surmised from the position of its doorway, does not belong to the ward depicted, but to that on the other side of the corridor from itself. The water-closet of each ward was across the corridor from the doorway of the ward to which it belonged; its relation to the ward and corridor may be seen on the general plan.



1, Ward, showing position of beds; 2, 2, 2, 2, Stoves; 3, 3, Nurses' rooms; 4, Small ward; 5, Scullery; 6, Sink; 7, Bath-room; 8, Water-closets

The central corridor with its small wards, sculleries, sinks, bath-rooms and water-closets, and the main or pavilion wards with their nurses' rooms, were all sheltered by a continuous roof; and as the partition walls of the various subdivisions under it were only eight or ten feet high, there was a free communication overhead between all



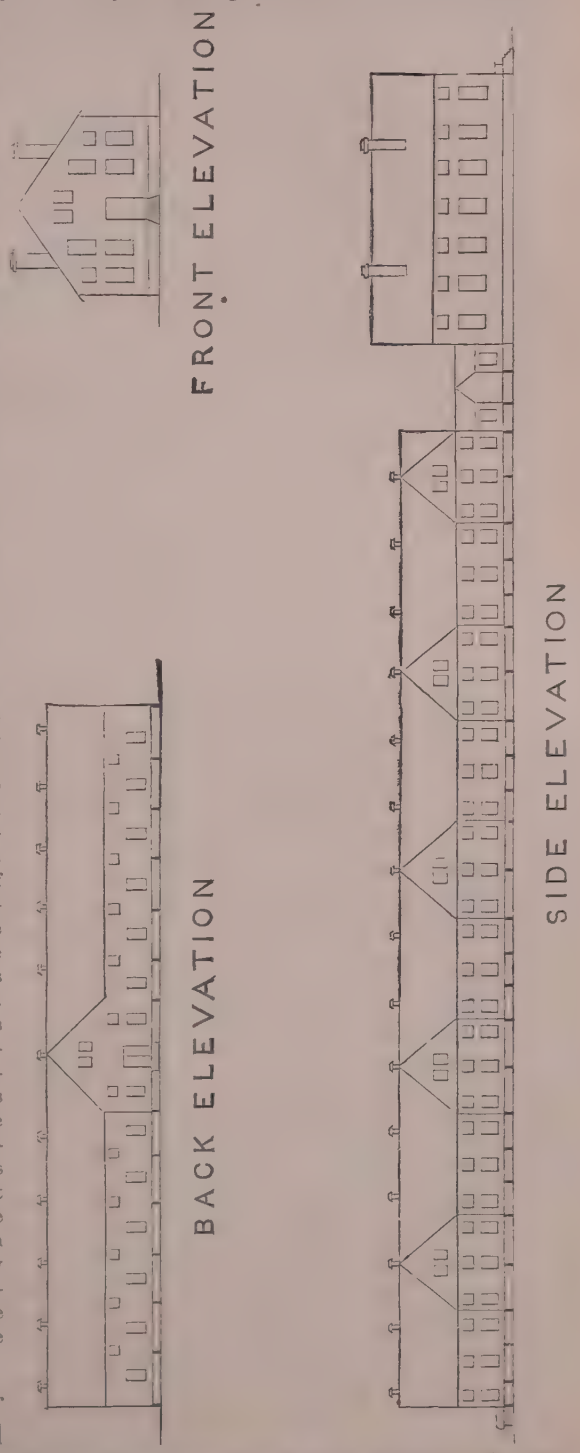
Scale 1/32.—*Ground plan*: 1, Central hall; 2, Office; 3, 4, 5, Surgeons' rooms; 6, Store-room; 7, Matron's room; 8, Office of officer of the day; 9, 10, Surgeons' rooms; 11, 12, Dispensary; 13, Officers' mess; 14, Scullery; 15, Kitchen; 16, Cook-house; 17, Ice-house; W, W, Wards. *Second story*: *a*, *b*, *d*, *f*, Attendants' rooms; *c*, Extra-diet kitchen; *e* and *i*, Knapsack-rooms; *g*, Store-room; *h*, Clothing-room; A, Guard-house; B, Dead-house.

parts of the building. Twenty beds are represented in one of the main wards, but the number was afterwards considerably increased. At JUDICIARY SQUARE the capacity of the hospital was augmented by canvas for 160 patients, and at MOUNT PLEASANT provision was made for 1,026 patients by pitching 57 tent-pavilions, each consisting of three hospital-tents placed end on to each other. These canvas pavilions were arranged in parallel rows with wide intervening avenues.

From the central corridor between the administration building and the entrance to the first or nearest ward was a passage leading to the kitchen and laundry; the guard-house, dead-house and stables were in detached buildings.

The JUDICIARY SQUARE hospital was connected with the city water-mains and sewerage system. At MOUNT PLEASANT water was pumped from wells by a steam-engine to an elevated wooden tank, whence it was distributed to the wards and kitchen. The sewer-pipe of the hospital ran underneath and parallel with the main corridor, receiving the laterals from the successive baths, sinks and closets, and discharging into a neighboring pond.

Surgeon CHARLES PAGE, U. S. Army, reported as follows concerning the JUDICIARY SQUARE hospital: The hospital is built with wings extending at right angles from each side of a corridor and separated from each other by a distance equal to their own width, each ward being opposite the vacant space on the other side of the corridor. In the corridor are built bath-rooms, privies, scullieries and water-sinks so arranged that each ward is connected with its own conveniences. The floor of the building is raised about three feet from the ground and supported on piles, enclosed, but allowed a free circulation of air under the house by means of numerous doors. The wards are well supplied with windows, having two sets, one from the floor six feet up, with double sash, and one under the eaves, three feet square, moving on a central pivot. The eaves are twelve feet from the floor. The building is not ceiled or plastered. At the ridge of the roof ventilators are placed ten feet apart. The building is well suited for a hospital in many respects. The arrangement of the wards is convenient for assigning the different assistants and attendants to their duties. It is easily kept clean and there is but little noise in the house. The absence of stairways renders it easy for the patients and attendants to get about, and the abundance of windows for admitting light and air are all great advantages. The disadvantages are the situation of the privies and the communication through the corridor over the partitions of the air of the different wards. The partitions extend only eight feet from the floor and the eaves of the house are twelve feet, leaving a space four feet deep perfectly open and communicating throughout the whole hospital excepting the kitchen and administration building. These defects might have been obviated by placing the privies at the free ends of the wards and extending the partitions to the roof, but in the latter case some of the wards would get the breeze and others be under the lee.



In carrying out the plans proposed for these hospitals it will be seen that several grievous mistakes were made. In the original plan the water-closets were placed at the free ends of the wards, but, from motives of economy on the part of those charged with the construc-

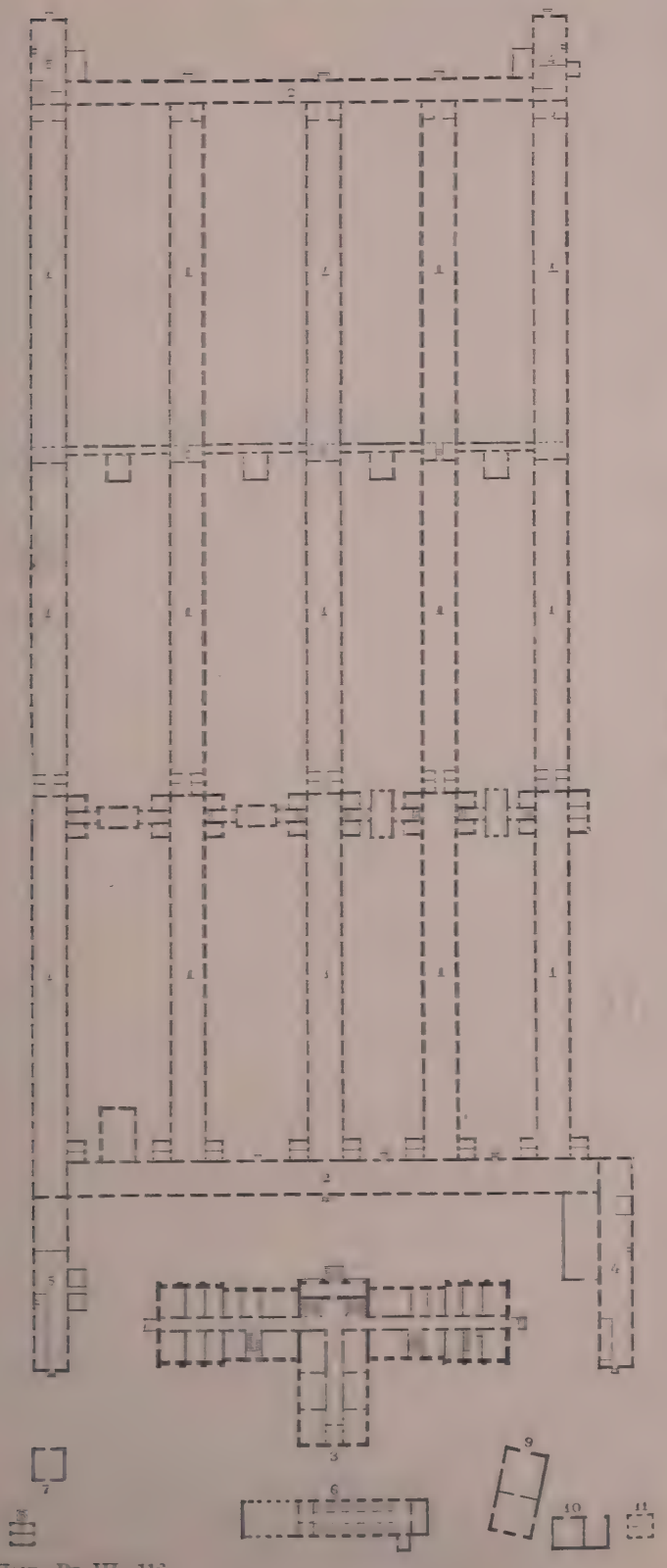
tion, they were ranged along the sides of the central corridor that a single sewer-pipe might suffice for both sets of closets. In addition to this, the partitions which separated the water-closets from the rest of the house were incomplete, rising no higher than those between the wards and the central corridor. Offensive emanations from these places soon became a matter of serious consideration. The evil was remedied to a certain extent in both hospitals by extending the partitions of the water-closets to the roof and supplying them with special ventilating shafts. Concerning this alteration at the MOUNT PLEASANT hospital Medical Cadet ELLIOTT COUES, U. S. Army, reported as follows:

The ten wards, with their accompanying rooms, are not entirely separated from each other, but all have communication with the general interior of the building. The partitions which form the sides of the main corridor and the passages leading into the wards, as well as the sides of the "isolating wards," scullery and bath-room, are only ten feet high, less than half the height of the ridge of the building. This partial separation affords a complete communication of the wards with each other through the main central portion. The only exception to this is the water-closets. The odor arising from these was found so offensive that it became necessary to continue the partitions between them and the rest of the building quite to the roof and add ventilators above and below. By these means the difficulty was entirely obviated.

The grand and general objection to the plan of these hospitals lay in the common atmosphere which the single roof and screen partitions gave to all the rooms occupied by the sick, including even those assigned for purposes of isolation. Although nominally built upon the pavilion principle, they were wanting in the very point which is the leading idea of this system.

At the CHESTER HOSPITAL, Chester, Pa., the advantages of the pavilion system were lost by the method of aggregation of the wards. Indeed, it would be difficult to conceive of an arrangement of fifteen wards on a given area which would so effectually interfere with ventilation as that adopted in the construction of this establishment. Three long wards were joined end to end, making a building so extravagantly long that an air-movement in its interior in the direction of its length should have been inconceivable even had there been open ends and no partitions. Five such buildings, placed one behind the other at close intervals, had their ends and those of their intervals closed up by the imposition of a continuous building at each end, used as dining-rooms and associated kitchens. The four long and narrow intervals between the rows were then subdivided by the erection of privies and other outbuildings, so that they became converted into twelve narrow and perfectly closed courts into which the windows of the wards opened, excepting those in the exterior wall of the outer series of buildings. To complete the insanitary conditions within these courts, the privies were deep vaults constantly filled with subsoil water and exhaling odors which had no lateral exits save through the wards of the hospital. This particularly infelicitous method of aggregation, for which an architect of Philadelphia appears to have been responsible, is illustrated on the opposite page.

The CHESTER HOSPITAL was situated on a rising ground in the outskirts of Chester, Pa. Its nucleus was a college building, which afforded quarters and offices for the medical staff, dispensary, store-rooms, etc., with wards on the upper floors. From this building five long sheds of rough boards, roofed with tarred paper, extended parallel with each other towards the town. Each of these was divided by two transverse partitions, with doors of communication, into three wards of 230, 190 and 205 feet in length respectively. On account of the slope of the ground these wards were terraced, those nearest the college building being on a level one step higher than those continuous with them on the farther side. These long buildings were separated laterally by intervals of fifty feet. Running at right angles to them, and closing them in completely at the ends, were similar sheds built for dining-rooms. The outer sheds of the series of five were prolonged at their ends beyond the dining-room connection, the extensions thus formed being used for kitchens, laundry and quarters of employés. The length of each of these two outer sheds was 775 feet, of each of the three interior sheds 625 feet. The long fifty-feet intervals between the sheds were divided transversely at each terrace-step or ward-partition by the erection of privy-houses, bath- and wash-rooms, pantries and coal-bins. The pavilion-wards afforded 1,000 cubic feet of space to each of 867 patients. Ventilation was by the ridge, the open-



CHESTER HOSPITAL, CHESTER, PA.

1, Wards; 2, Piazza room and chapel; 3, Chaplain's room, operating room, examining room, clothing room, bed rooms, ladies' confectionary room, officers' mess room, ladies' mess room, surgeon in charge, dispensary, office of clerk, steward, etc.; 4, Ladies' kitchen, contribution room, special diet kitchen, etc.; 5, 5, Kitchen, washing and ironing rooms; 6, knapsack room and barracks; 7, Guards; 8, Privy vault; 9, Carpenter shop and stable; 10, Dead room; wagon for sick and wounded; 11, Privy-vault. The privy-vaults, connected with the wards, are in the centre of the intervals. The small rooms at the ends of the wards were used by ward masters as wash rooms, bath rooms, pantries and cook-ins.

ings protected during cold or stormy weather by shutters on horizontal pivots. The water-supply was pumped from the creek into distributing tanks. The privies were very deep vaults or pits, which speedily became filled with liquid and gave rise to disagreeable odors which penetrated into the wards. Pumping them out was found to be expensive and unsatisfactory. Drains were built to discharge into a neighboring tide-water creek, but as they left the vault eight or ten feet above the level of its bottom the evil was by no means wholly remedied.

In some of the hospitals built about this time the elementary idea of the pavilion system was carried into practice at the expense of the organization of the hospital. Thus, at the DE CAMP HOSPITAL, David's Island, New York Harbor, two long pavilions parallel to each other, with a space between them sufficient for a third long building, used as kitchen, dining-room and attendants' quarters for the ward on either side of it, constituted the unit; and the hospital was composed of an aggregation of these. Administration was difficult, and material duplicated to an extravagant extent in an establishment of this kind.

The DE CAMP HOSPITAL was established on David's Island, New York Harbor, at the western entrance to Long Island Sound, half a mile from the mainland, opposite the town of New Rochelle and about 22 miles from New York City. The grounds, which included the whole of the island, comprised 80 acres about 30 or 40 feet above the sea level, dotted with large shade-trees, which at one end clustered into a pleasant grove. On one side, separated from the sea by a strip of beach, was a pond of fresh water fed by springs.

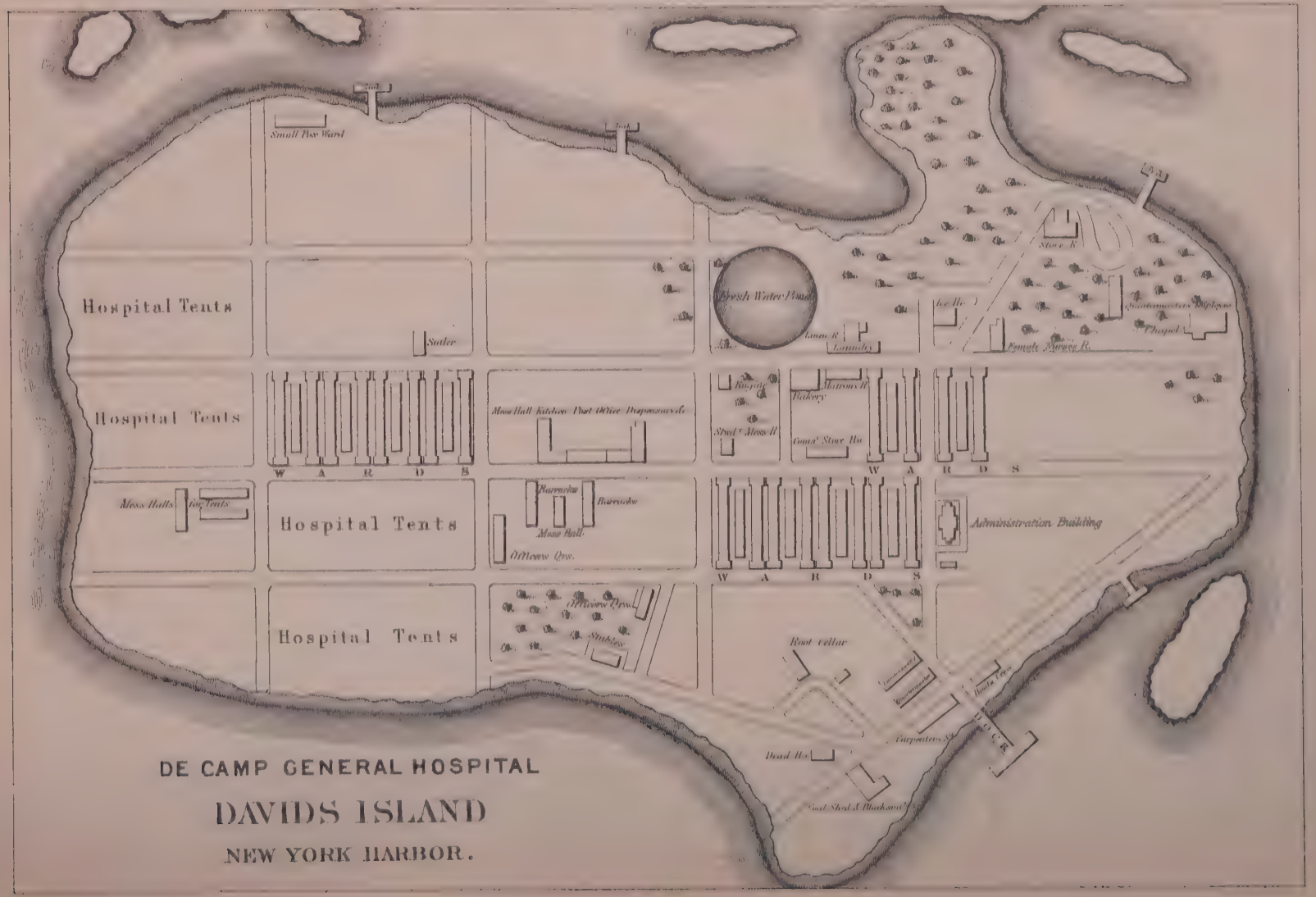
The plate facing this page represents the hospital at a late period of its history, when 20 pavilions had been constructed, with mess-halls for the tent-wards, barracks for the guard and cottage quarters for the medical officers. The pavilions were placed parallel to each other, but each was completely separate from its neighbor. Two adjacent pavilions, however, were associated with each other by a shorter building in the space between them, which was used in connection with both as a kitchen, mess-room, smoking-room and quarters for nurses and attendants. The general diet of the patients in the tent-wards was cooked in the single large kitchen. Extra diets for all the wards were prepared in special kitchens.

The pavilions were substantially built, lathed and plastered, well lighted, ventilated by the ridge and heated by coal-stoves. They were separated from each other on one side and from their adjacent mess-buildings on the other by an interval of 25 feet. Each was $248 \times 24 \times 15$ feet, and divided transversely into four wards, each measuring 50 feet in length and containing 20 beds. The remainder of the length of the pavilion was occupied by ward conveniences. Bath-rooms, water-closets and lavatories were provided at the ends of each building. These were cut off from the main portion of the pavilion by cross ventilation through a hall; and between them and the wards a space was partitioned off at each end for a wardmaster's room, knapsack-room and store-room. The 20 pavilion-wards afforded 60 square feet and 900 cubic feet of space to each of 1,600 patients. Drinking water was obtained from wells in various parts of the grounds. The general supply was pumped by a stationary engine into sunken cisterns under each mess-hall, from which it was raised by hand. On account of this limitation of the supply the water-closets were not at all times free from odor; and as no provision was made for the distribution of warm water to the wards the bath-rooms, particularly in winter, were rendered comparatively useless.

In some instances, where existing buildings had been converted to hospital purposes, the addition of some pavilions more or less detached altered the character of the establishment by permitting the old building to be used as offices, quarters and store-rooms. The arrangement of the pavilions in such cases depended generally on peculiarities of the area available for their erection. The plans of the SUMMIT HOSPITAL, Philadelphia, Pa., may be submitted as an illustration of this development of the extemporized hospital.

SUMMIT HOUSE HOSPITAL, DELAWARE COUNTY, PA., was situated on the west side of the Darby plank road, about four miles from Market street bridge, Philadelphia, Pa. It was opened in March, 1862, in a suburban hotel, a three-story building of 65×50 feet, with a two-story back building 37×35 feet. The first story was divided by a hall 8 feet wide into one large room and two parlors, with the dining-room and kitchen behind. The second story had one large central chamber, with three smaller rooms on each side and four rooms in the back building. The third story had ten rooms, each accommodating two or three beds. All were excellently ventilated by well-hung sashes over the doors and by windows. A two-story veranda on three sides of the main building afforded a cool and shady place for convalescents able to exercise in the open air. The grounds covered an area of about two acres.

When the pavilions were built the rooms of the hotel were given up for the use of the medical staff and employés, and as store-rooms, dispensary, etc. Three pavilions were erected, one on one side of the hotel, two on the other, parallel with its sides, and connected with the back building of the hotel and with each other by a long pavilion used as a dining-room. These wards were roughly constructed sheds with ridge ventilation. At the rear end of each were small rooms occupied as wardmaster's room and pantry, bath-rooms and privies, the former partitioned off from the end of the ward, the latter attached to its side. The privies were cisterns, emptied when necessary; they were ventilated by underground flues connected with the chimney of a steam-engine. External to the two wards on the left of the hotel was an irregular shed, formerly a horse-stand, which was fitted with latticed ridge towers and con-

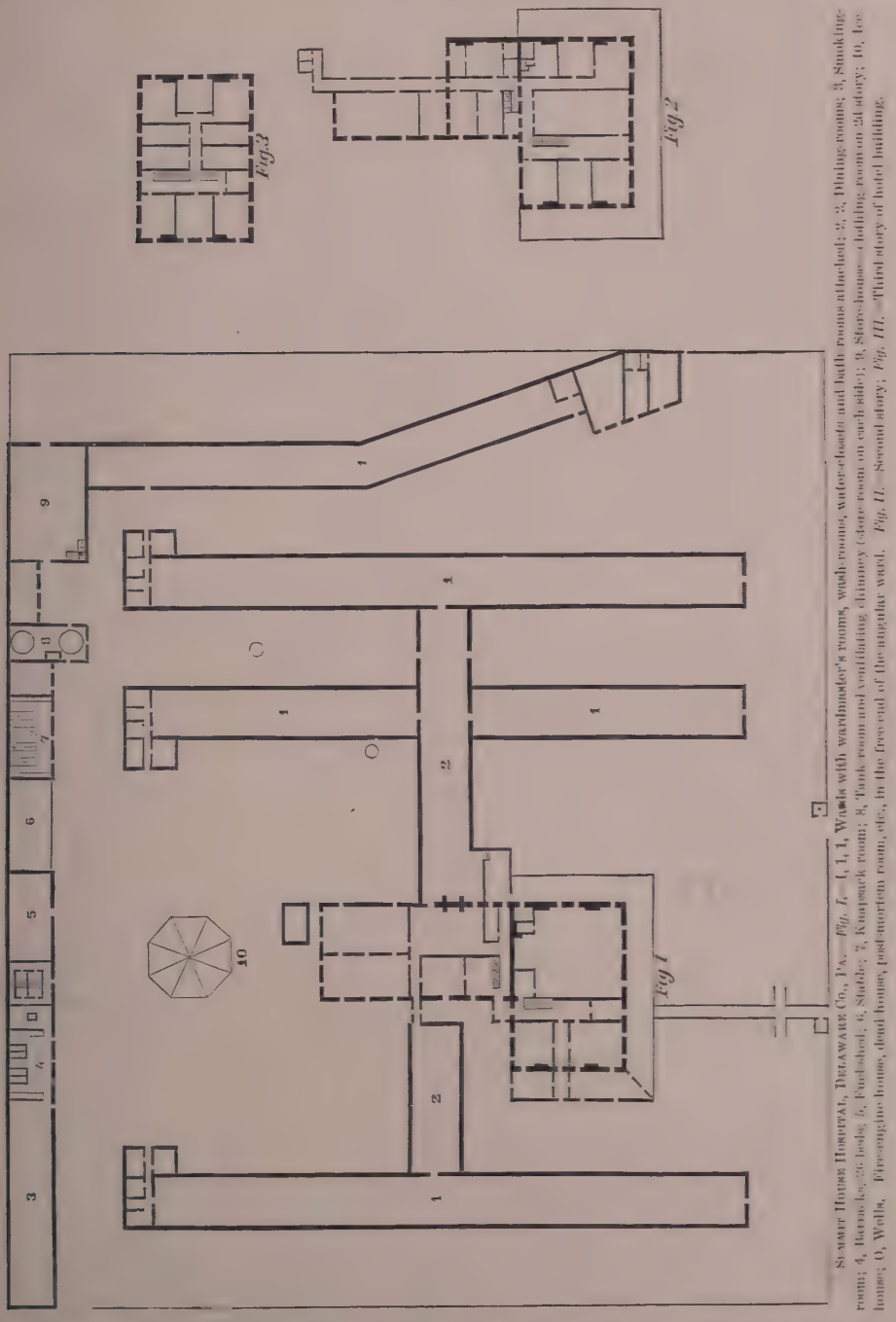


DE CAMP GENERAL HOSPITAL

DAVIDS ISLAND

NEW YORK HARBOR.

verted into a ward. These contained 353 beds with 750 feet of air-space to each. A number of tents were afterwards pitched to increase the hospital accommodation. Along the rear of the lot was a long wooden building which contained rooms variously occupied at different times as stables, store-rooms, knapsack-room, guards' barracks, guard-house, etc. Water was raised from a neighboring stream into tanks for distribution; well-water was also used.



SQUARE HOUSE HOSPITAL, DELAWARE CO., PA. — *Figs. 1–3.* — 1, 1, 1, Wards with wardmaster's rooms, wash-rooms, water-closets and bath-rooms attached; 2, 2, Dining-rooms; 3, Smoking-room; 4, Barrack for 36 beds; 5, Enclosed; 6, Stables; 7, Knapsack room; 8, Tank-room and ventilating chimney (store-room on each side); 9, Store-house — bedding-room on 2d story; 10, Ice-house; 0, Wells. Fire-engine house, dead-house, post-mortem room, etc., in the free end of the angular ward. *Fig. II.* — Second story; *Fig. III.* — Third story of hotel building.

At the BAXTER HOSPITAL, Burlington, Vt., the added pavilions projected lengthwise from one side of a covered corridor which had the former Marine hospital at one end as an administration building. As the intervals between the pavilions were 48 feet wide, it is

evident that there was ample space at command, and that this arrangement was in no way constrained by local conditions, but was regarded by those who adopted it as the best that their experience enabled them to devise. The wards were arranged in a similar manner at the CRITTENDEN HOSPITAL, Louisville, Ky., where a covered corridor 8 feet wide ran along the rear of seven pavilions, and at the TILTON HOSPITAL, Wilmington, Del., where six pavilions were similarly associated. The plan of the Tilton hospital is submitted on the opposite page as an illustration of this method of arrangement. The covered corridor, originally intended as a bond of connection and means of communication between the various parts of these pavilion hospitals, was very generally put to use as a common dining-hall.

The BAXTER HOSPITAL, BURLINGTON, VT., was built on the grounds of the Marine hospital, on a terrace overlooking Lake Champlain and about 100 feet above the level of its waters. The buildings consisted of a two-story brick house, formerly the Marine hospital, which was used as quarters, store-rooms, offices, etc., and 21 wooden pavilions, nine of which were much longer than the others and were used as wards, one as a general kitchen, one as a mess-hall, one as a dispensary and store-room, one as a linen-room and store-room, with a finished attic for non-commissioned officers, one isolated as a pest-ward, four respectively as dead-house, ice-house, store-room and barn, one as guard-house and knapsack-room, and two for the quarters and mess of the Veteran Reserve guard.

The long pavilion-wards parallel with each other and separated by intervals of 48 feet abutted on a covered corridor which extended rearward from the administration building. Each measured 190 × 24 × 13 feet, less two rooms 9 × 10 feet, cut off at either end for use as nurses' room, water-closets, bath-rooms, etc. The remaining ward-space was occupied by 64 beds, to each of which it gave about 65 feet of area and 850 feet of air-space. Ventilation was by the ridge. Hospital tents were pitched for the accommodation of about 120 patients. Water was supplied to the kitchen from a neighboring spring by a wooden conduit. The bath-rooms and water-closets in the pavilions were not used on account of the defective character of the water-supply. The administration building contained bath-rooms for special use. Covered sinks were provided for the use of the inmates of the pavilions.

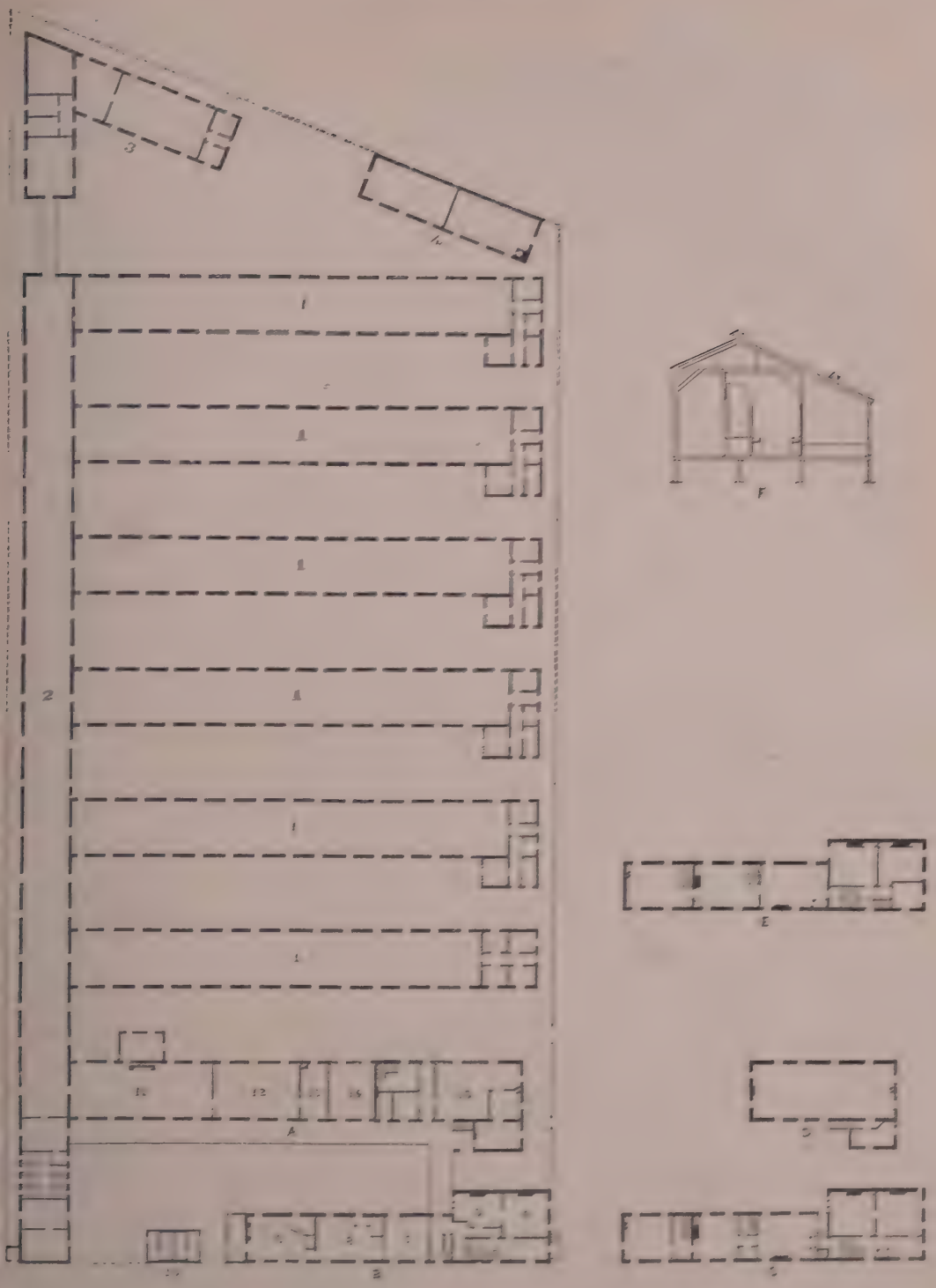
The CRITTENDEN HOSPITAL, BROADWAY, BETWEEN 14TH AND 15TH STREETS, LOUISVILLE, KY., consisted of seven parallel pavilions projecting at right angles from one side of a covered corridor eight feet wide. The free ends of these buildings constituted the front of the hospital. The pavilions were one-story shingle-roofed frames, lathed and plastered to the eaves but unceiled. Each was 180 × 24 feet by 14 to the eaves and 19 to the ridge, and was separated from its neighbors by an interval of 38 feet. The central pavilion was used for offices, etc.; it was divided along its length by a hallway 8 feet wide, on either side of which were ten rooms used by the administration. A prolongation of this pavilion for 90 feet on the rearward side of the covered corridor constituted the mess-room, a wing on one side of its further end being used by the cooks and one on the other side by the laundresses.

The three wards on each side of the central building were each lighted by 30 windows, 15 on a side, ventilated by the ridge in summer and by shafts 18 inches square, through which the stove-pipes made their exit, and warmed by four stoves, each partly surrounded by a jacket of sheet-iron with an air-box communicating with it. Each contained 60 beds—30 on a side. At one end of the ward 9 feet of its length was partitioned off, giving two rooms 9 × 9 feet, used as nurses' room and store-rooms; at the other end a similar partition gave space for bath-rooms and lavatories. There were no water-closets connected with the wards. The privies, in rear of the hospital buildings, were three in number, each 14 × 14 feet; each had sixteen seats arranged on the four sides of a central ventilating-shaft; the pits were 12 × 12 and about 30 feet deep. Drainage was superficial and led into the street gutters.

The TILTON HOSPITAL, WILMINGTON, DEL., occupied the block of level ground, having an area of 1½ acres, between Tatnall and West streets, Ninth street and Delaware avenue. It consisted of a three-story brick administration building and six pavilion-wards, parallel to each other and projecting at right angles from a wide-covered corridor, which ultimately became utilized as a common dining-room for all the wards. The details of the administration building may be gathered from the plans submitted.

The wards were well and firmly built of rough boards, having an interior board lining with six inches of air-space between the shells. The intervals between adjacent wards measured 26 feet. Each ward was 19 feet wide, 13½ to the plate and 17½ to the ridge. They were 154 feet long and contained 60 beds each, excepting that nearest to the administration building, which was 144 feet in length and contained only 56 beds. The wards were lighted by 14 or 15 windows on each side, ventilated by the open ridge and 13 slide-covered openings on each side near the floor, and warmed each by two coal-stoves, the pipes of which passed through the ventilating shafts to facilitate the air movement in the cold season. Bath-rooms and lavatories were provided at the free ends of each pavilion. Water-closets were separated from the wards by a ventilated passage excepting in the case of the pavilion nearest the administration building. A long trough under the seat of each closet was emptied and flushed two or three times a day through pipe-sewers discharging into a deep covered well at some distance from the hospital. The water-supply was derived from the city water-works.

A central corridor with a double row of attached pavilions, one on each side, does not appear to have met with favor after the recognized failure of attempts of that kind in the Mount Pleasant and Judiciary Square Hospitals at Washington, D. C. The nearest approach



closet and bath-room; 4, Tank-house; 5, General offices; 6, Surgeon in charge; 7, Officer of the day; 8, Officers' mess; 9, Kitchen and coal-house; 10, Water-closets; 11, Kitchen and coal-house; 12, Wash- and ironing-room; 13, Refrigerator; 14, Store-room; 15, Servant's store-room, sleeping, office and bath-room. A, B, Ground floor of administration building. C, Second story of A, containing rooms of surgeon in charge, index correspondence, bath and water-closet. D, Ward in second story of B. E, Third story of B, containing dormitories of officers, etc. F, Transverse section through ward-master's room, wash-room and water-closets. Picket-fence marked _____.

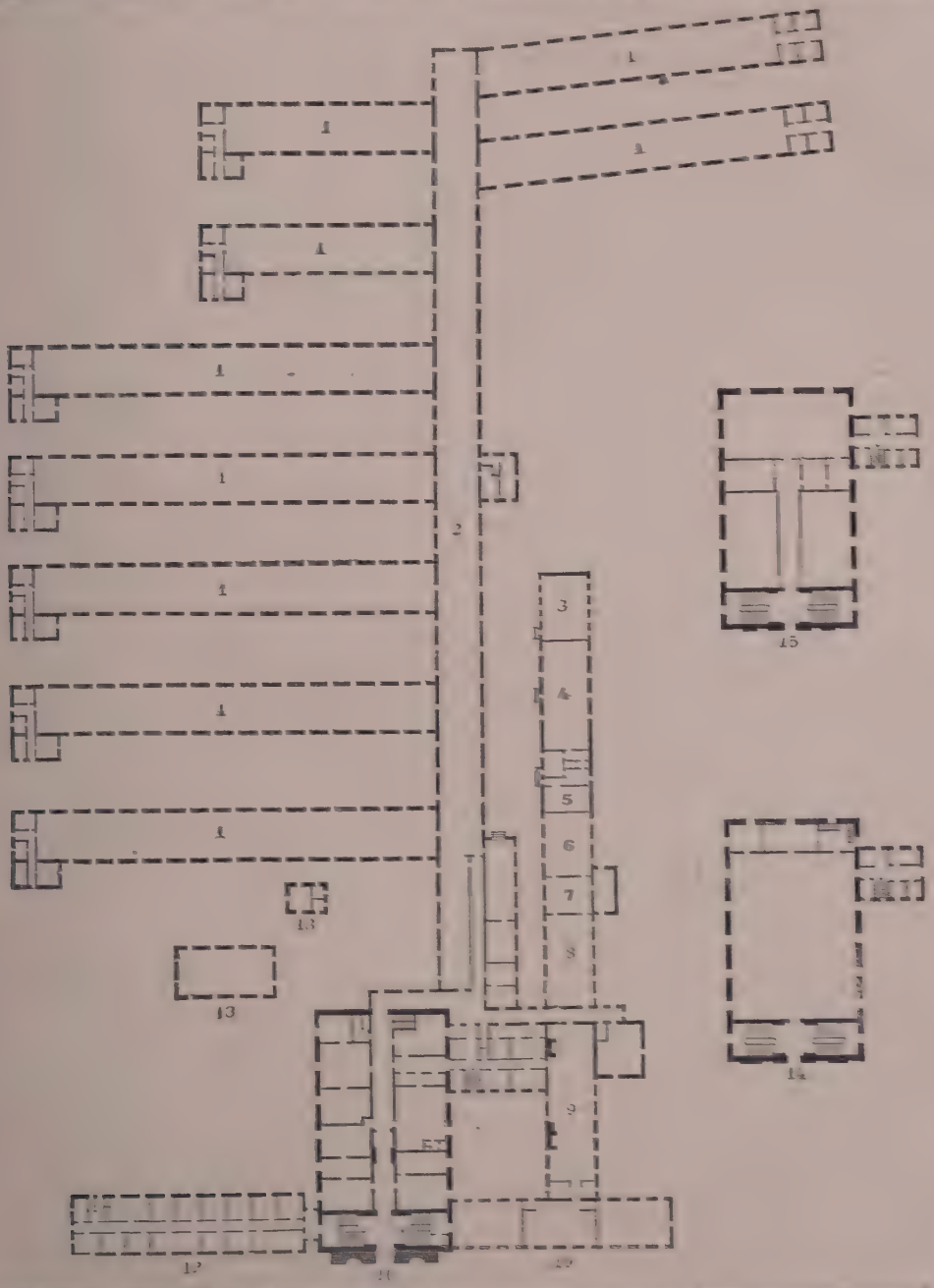
to a double row was found in the CUYLER HOSPITAL, Germantown, Pa., where two wards on one side were opposed to seven on the other, but the nature of the ground appears to have been responsible for this ward-movement to the other side of the corridor.

CUYLER HOSPITAL, GERMANTOWN, PA., had the town-hall for its nucleus. The ground floor was used as offices and quarters; the second floor afforded shelter for 76 patients in one ward 79 × 50 feet; three rooms on the third floor were used for nurses and patients. To this the pavilion hospital was afterwards attached. A long corridor, used as a dining-room for all the wards, projected backward from the town-hall building. Seven pavilions placed parallel to each other, and at right angles to the corridor, opened into the latter on the right; two joined it at an obtuse angle on the left. A pavilion was also erected in rear of the main building and parallel with and to the left of the corridor. This was used as a laundry, guard-room, knapsack-room, etc. Another, built on the left of the main building and parallel with its front, gave additional accommodation to the administration. The irregularity in the plan of this hospital was occasioned by the natural features of the lot on which the pavilions were erected. The wards were coarsely finished, ridge-ventilated sheds partitioned off at their free ends for the wardmaster and lavatory, but differing from most of those built at the same period in having the bath-rooms and water-closets in an addition to the side of this end of the pavilion. The closets were furnished with an iron trough, which was flushed into the sewers three times a day. The water-supply was derived from the Germantown water-works and from wells.

There appears, however, to have been no objection to parallel corridors with an elongated space between them, constituting a hospital yard, and the pavilions attached along the outer side of each corridor. This was the plan adopted at the SATTERLEE HOSPITAL, West Philadelphia, Pa., where fourteen parallel pavilions, each 167 × 24 feet, projected from each of the corridors at short intervals of 21 feet. This hospital was crowded on its area. The corridors were separated by an interspace the width of which was only 70 feet; and even this was blocked at the middle of its length by a transverse building containing the offices. This limitation of the width of the space separating the parallel corridors was not repeated in other hospitals. At the MCDOUGALL HOSPITAL, Fort Schuyler, N. Y., there were seventeen wards on each of the corridors, but the latter were separated widely from each other and ran into each other at one end in a semicircular curve. At the MCCLELLAN HOSPITAL, Philadelphia, Pa., the parallel corridors curved into each other at both ends, enclosing a large unencumbered central space, with the administration and executive buildings external to its sides and the pavilion-wards radiating from its rounded ends. At the MOWER HOSPITAL, Philadelphia, Pa., the enclosure was enlarged laterally and contained the various accessory buildings, while the wards, fifty in number, radiated from the outer margin of the corridor, which on the ground-plan formed a squarish figure with its angles rounded off. Lastly, at the JEFFERSON HOSPITAL, Jeffersonville, Ind., the covered corridor lost its parallelism on becoming converted into a circular figure enclosing an area 600 feet in diameter. At this hospital the corridor was 16 feet wide and 2,000 feet in length: twenty-four pavilion-wards, each 175 feet long, and some buildings of a similar size used as store-rooms, radiated at intervals of 46 feet from the outer aspect of the circle, while the other buildings necessary to the efficient administration of the hospital were contained in its interior.

SATTERLEE HOSPITAL, WEST PHILADELPHIA, *Surgeon* I. I. HAYES, *U. S. Vols., in charge, Oct.* 31, 1862.—This hospital was commenced May 1, 1862, and by the terms of the contract was to have been completed in forty days. Seven of the wards were ready for use on the 6th of June, and, as ordered, I proceeded to organize the hospital and prepare it for the reception of patients. On the 9th the completed wards were filled with patients, and the other wards were occupied as rapidly as finished. I was fortunate in being able to engage, as directed when the hospital was first opened, forty Sisters of Charity, whose labors have been unceasing and valuable. I enlisted also a sufficient number of hospital attendants, allowing eleven to each hundred patients. Many students of medicine volunteered their assistance and were placed on duty as acting medical cadets. This useful body of young men, performing duty without pay, at one time numbered as many as 41. The medical staff was enlarged as the hospital filled up, and at present there are 35 medical officers on duty, exclusive of 18 cadets. There are now thirty-six wards in the hospital,—twenty-eight in the house and eight in the hospital camp. The personnel of each ward comprises a surgeon, a Sister of Charity, a wardmaster and three nurses. When practicable a cadet is attached to each ward, and the resident assistant surgeons and acting assistant surgeons are so distributed as to be responsible for the wards during the absence of the non-resident medical officers.

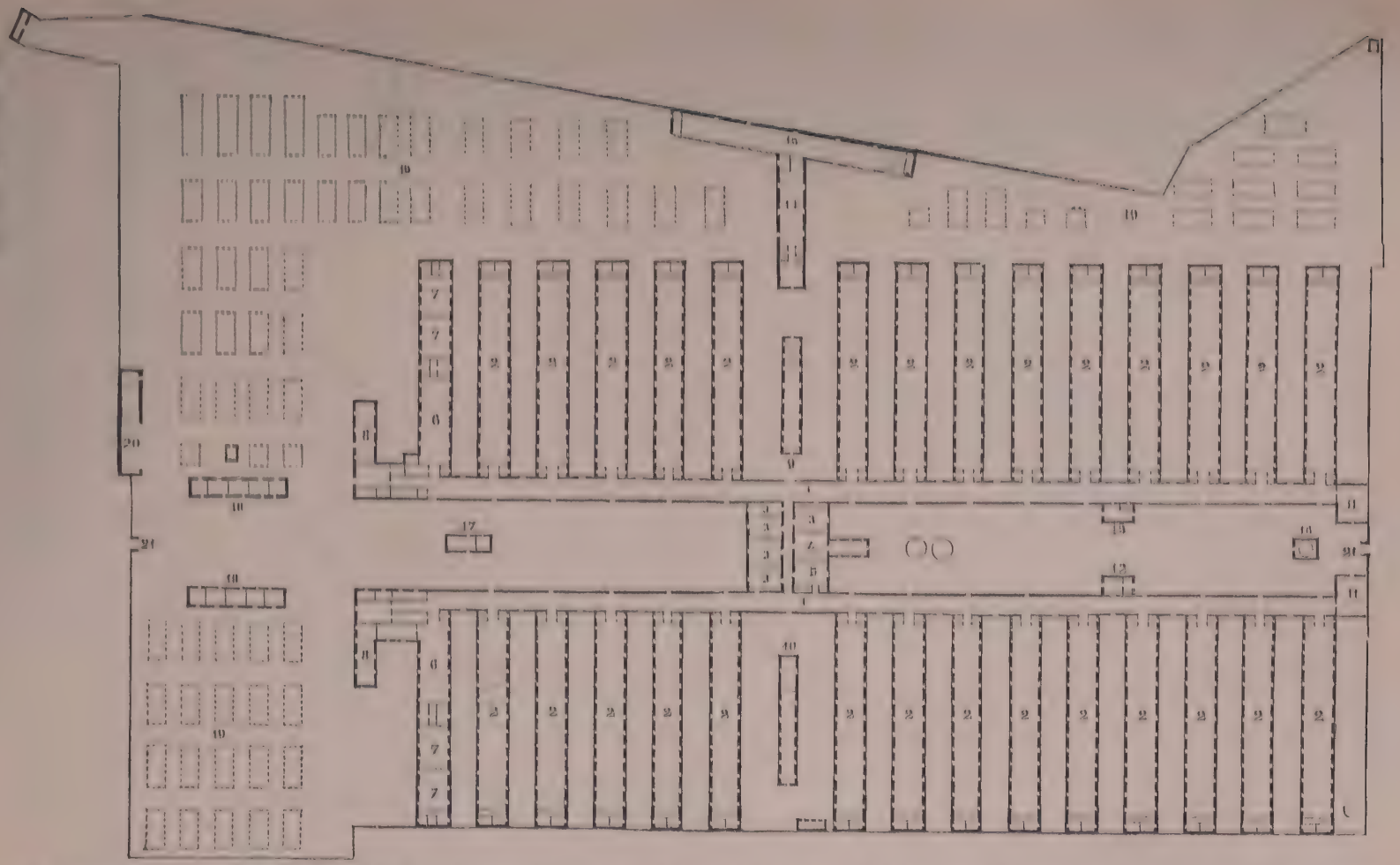
The hospital is located at the intersection of 44th and Spruce streets, a half mile outside of the present city limits, west of what is known as West Philadelphia. It is built upon an eminence about 200 feet above the bed of Mill creek and distant from it 250 yards. Its situation is eminently healthy. I had feared that a pool of water known as the Mahlonville Dam, which is about 400 yards southeast from the hospital, would breed malaria, but I am glad to say that the summer and fall have passed without the occurrence of a single case of disease attributable to that cause. This dam, however, if not removed, will become a source of trouble next summer, since it receives the sewage of the hospital from Mill creek. This hospital is surrounded by fine trees which afford shade to the soldiers



closets and bath-room; 13, 13, Guard-house and water-closet; 14, Second story of town-hall; large room and attic; 15, Third story, ward and dormitories of employes.

during the heat of summer. The building was originally intended to accommodate one thousand patients. It is built upon the pavilion plan, and is found to be healthy and convenient of management. The administration building, in the centre, is 71 × 63 feet and two stories high. The lower floor has a hall running through it, on one side of which there are three rooms; the central one is used as a surgery or dispensary, the others as mess-rooms for the officers. The central room on the opposite side of the hall is the reception-room; this is divided by a railing, behind which is the office of the assistant executive officer. Next to this room is the office of the surgeon-in-charge and of the executive officer; on the opposite side of the reception-room is the office of the resident surgeons, and back of that the donation-room. On the second floor of the administration building are twelve rooms, which are used as quarters for the officers; in addition to these there are for the same purpose two one-story buildings on the east front, each 75 × 14 feet and each containing five rooms. The administration building stands between and is attached to two corridors 71 feet apart, which are 14 feet wide and 13 feet high, and originally 560 feet long. These and the wards are only one story high. The corridors run east and west and are parallel with each other. The wards stand at right angles to them, and are each 167 feet long, 24 wide and 13 high; the roof has a pitch of 6 feet, and hence the height of the ward to the peak is 19 feet; there is no ceiling. The wards are 21 feet apart. In the original plan there were twenty wards—ten on each side. Soon after the original building was completed four wards were added on either side, making twenty-eight in all, and the corridors were lengthened to 740 feet. These corridors terminate at the eastern end each in a store-house, which is two stories high; the second story furnishes quarters for the Sisters of Charity. At the other end the corridors terminate in smoking-rooms, 28 × 25 feet, for the patients. Over the smoking-rooms are quarters on one side for clerks and on the other for druggists. A small wing running off from each corridor, midway between the smoking-rooms and the administration building, furnishes on one side a room for the chief wardmaster and on the other a mess-room for clerks and druggists. Two wings of the same dimensions as the wards, and running parallel with them, at the eastern end of the corridors, are used as kitchens and laundries, the one-half of each being appropriated to either purpose. The hospital thus consists of a central administration building, two attached corridors used as dining-rooms, and on either side fifteen wings. The sixth and seventh wings from the eastern end are 71 feet apart, and in the centre of the space on the north side is a building 100 × 14 feet, the larger part of which is used as a knapsack-room and the remainder as a *post-mortem* room. On the south side, in the corresponding space, is a building symmetrical with the one above mentioned, which is used as barracks for the guard and also as guard-house. The guard is composed of convalescent soldiers who are unfit to return to their regiments and numbers a full company. The wards are all of uniform construction. There are on each side 15 windows, 6 feet 8 inches by 2 feet 7 inches; they are 2 feet 10 inches from the floor and 3 feet 6 inches from the top of the wall. At the end of the ward which joins the corridor are two rooms, one on either side, 10 by 8 feet, one of which is used for a wardmaster, the other for a female nurse (Sister of Charity). At the opposite end are a water-closet and bath-room, the former 13 × 7, the latter 11 × 7 feet; these are separated from the ward by a hall 3 feet wide. The ward proper is thus reduced to 147 feet. The water-closet is arranged with a cast-iron receiver or trough 12 feet 3 inches long, 1 foot 1 inch deep, 1 foot 7 inches wide at the top and 1 foot 1 inch at the bottom. It is one-third filled with water drawn from a pipe which enters at one end, and at the other the accumulations are let off every hour through a three-inch discharge-pipe into the general sewer by elevating a lever which is controlled by lock and key. Each bath-room is supplied with a cast-iron receiver for washing the hands and face and a cast-iron bath-tub with hot and cold water. Hot water is distributed to all parts of the building by means of iron pipes leading from an iron tank in each kitchen, which is heated by steam from a boiler placed in the centre of the front yard, midway between the corridors. This same boiler furnishes heat for the greater portion of the cooking that is done in both kitchens. The arrangements for cooking in each kitchen are a large range, two large cook-stoves and three boilers each holding 60 gallons. The wards are ventilated at the ridge, twenty of them as shown in Fig. 1 and the remainder by the method given in Fig. 2 (see page 931). The dimensions of the former ventilator are: Length 136 feet, height above the roof 3 feet 6 inches and width (corresponding to the opening in the roof) 3 feet 11 inches; the sides are closed in bad weather by a series of revolving shutters 3 feet long by 2½ feet wide, which are drawn by a cord. The ventilation of the eight last-mentioned wards is the ridge ventilation proper. These ventilators extend the full length of the wards; the opening in the roof is 1½ feet wide, the elevation of the ventilator above the roof of the ward 8 inches, and the roof of the ventilator is 3 feet 6 inches in width on each side. The sewerage of the hospital is good. A 10-inch clay pipe, buried beyond the reach of frost, runs along the ends of the wards and receives the pipes from the water-closets, bath-rooms, laundries, kitchens, etc. The two unite at the east end of the hospital and empty into a 12-inch pipe, which leads into a sink, from which the liquid drainage is carried into Mill creek. This sink is closed over with earth and is one hundred yards from the hospital. The supply of water has been until recently insufficient,—the original pipes were much too small. I have recently had laid a 6-inch main leading from the street and 4-inch distributing-pipes along the ends of the wards. I have also had constructed two reservoirs holding 45,000 gallons. The water is supplied from the Schuylkill river by the West Philadelphia works, and a stand-pipe gives us mostly a good head of water. The hospital is lighted with gas from the Philadelphia works. Early in July I put up 150 hospital tents on the grounds on the east and south sides of the hospital. Each of these tents is 14 × 15 feet and accommodates six patients. A kitchen and dining-room were at the same time erected for this additional number of men, and they are still in use; the kitchen is supplied with a large range and three boilers each containing 90 gallons.

The hospital grounds are enclosed by a picket-fence 14 feet high and embrace 12½ acres. The buildings form a parallelogram 815 feet long by 433 feet wide, and in area 8.1 acres, just one-half of which is covered by hospital floors. The capacity of the hospital for patients is as follows: There being twelve windows on either side of each ward and two patients placed between each two windows, twenty-five are accommodated on each side, or fifty in a



SAFFERLEY HOSPITAL.—1, Corridors; 2, Wards; 3, 3, 3, Offices; 4, Dispensary; 5, Officers' mess; 6, 6, Kitchens; 7, 7, 7, 7, Laundries; 8, 8, Store-rooms; 9, Knapsack-room; Guard-barracks; 11, 11, Smoking-rooms; 12, Chief warder's room, afterwards used as a printing office; 13, Messroom for druggists, afterwards used as a barber-shop; 14, Extra-diet kitchen; 15, Reading and lecture-room; 16, Tank; 17, Boiler-room; 18, Officers' quarters; 19, Hospital tents in rows; 20, Stables; 21, 21, Gateways.

ward, thus allowing one inch less than six linear feet and a floor area of 70 square feet to each bed. By this estimate there would be to each bed 1,128 cubic feet of air. The hospital would thus accommodate 1,400 patients. During the summer I have frequently had 70 patients in a ward, giving 800 cubic feet to each. Each ward now contains 60 beds with 940 cubic feet per bed. The largest number which the building will accommodate is therefore 1,960, but this number I consider too large for health during winter. In the hospital camp I have had space for 900 beds. This number was reduced, by beds for nurses and tents of administration, to 820. The largest capacity of the hospital has thus been 2,780 beds. The largest number of patients actually accommodated at any one time was 2,458.

In relation to the fitness of the building for hospital purposes and the advantages and disadvantages of the plan, I am not able to speak with the accuracy which is desirable, the hospital only having been in use during the summer; but thus far it has borne the test very well, and I entertain no doubt that as a winter hospital it will prove to be both comfortable and healthy. The parallelism and closeness of the wards to each other I have not found to be practically objectionable. The circulation of air has been good and the wards were reasonably cool during the hot weather. The wards have been always free from odor and the air fresh. The long corridors give great facilities for atmospheric circulation. The ventilation, however, is imperfect and must be changed for winter use. The ventilators of the first twenty wards are too open and too large, and of the eight other wards the ventilator roof is four inches too high; it should, besides, project one foot farther. The plan is in most respects admirably arranged for administration, the chief fault being in the division of the kitchens and their distance from the offices; its principal merit is its compactness, and it is recommended by the ease with which every part of the building may be reached. If it did not involve two kitchens I should prefer it to any other which I have seen. The disadvantages anticipated from the parallelism of the wards is found to be trifling in practice. The building is now being plastered and will be rendered tight and comfortable. It will be heated by means of coal-stoves, of which 200 are now being put up.

The McDougall Hospital, Fort Schuyler, N. Y. Harbor, was built in the autumn of 1862, on the neck of the peninsula which has Fort Schuyler on its water-front. Its grounds covered 40 acres, including the entire width of the peninsula between the fort and the mainland. The wards, consisting of 34 pavilions, were arranged in two lines, 17 in each, projecting from the exterior aspects of two parallel covered corridors which enclosed a courtyard as long as the hospital establishment and about 140 feet wide. At the western end of the courtyard the corridor of one side was continued into that of the other in a semicircular curve. At the other end the courtyard was nearly closed in by the erection of a two-story executive building. The wards were set obliquely along the sides of the corridor, each forming an obtuse angle with that portion of the corridor leading to the administration building and an acute angle with the prolongation of the corridor beyond its own attachment. An irregularity of the ground prevented the symmetry of this plan from being realized in practice; eight of the buildings abutting on the southern prong of the corridor were shorter than the others—five of them notably so. They were all too low and narrow, and so frail in their construction that most of them had to be propped externally as a safeguard against high winds. They were roofed with tarred paper and asphalt. They had good ridge ventilation, but the windows were too small and did not extend close enough to the floor. Twenty-six of the wards were $147 \times 17\frac{1}{2} \times 8$ feet; three varied from 116 to 142 feet in length, and five from 63 to 98 feet, averaging about 80 feet in length. Medical officers on duty at the hospital complained, when the building was in progress, that the plans accepted by the Quartermaster General were not carried out,—that the width should have been $22\frac{1}{2}$ feet and the height to the plates 12 feet. Each ward of the full length was intended for the accommodation of 50 patients; a wardmaster's room was partitioned off from the free end of each, and two small rooms in an outhouse attached to the side of the building, at the angle of junction with the end, served as bath-rooms and water-closets, the effluents of which discharged by pipe-sewers into the waters of the sound. The closets were fitted with trough latrines. At the attached extremity of each ward 24 feet of its length was partitioned off as a mess-room and china-closet. A tramway running along the corridor facilitated the transmission of supplies.

The executive building at the free end of the hospital enclosure contained the surgeon's office, clerks' rooms, dispensary, linen-room, knapsack-room, printing-room, reading-room, lavatory, etc. Behind this, and between it and the glacis of the fort, was a two-story wooden building divided up into quarters for the medical officers. The ice-house, dead-house, carpenters' shops, sutler's store, etc., were in the flanks of this building. At the opposite extremity of the hospital yard, connected with the convexity of the semicircular curve of the corridor, was a long two-story building well furnished with steam-boilers for kitchen use, a bakery, swill-house and subsistence store-room, a steam laundry, drying- and mangling-room, with quarters overhead for the employés.

In the area enclosed by the pavilions was a commodious and well-arranged chapel, together with a guard-house, operating-room and tank-house, with a steam force-pump over the main well. Three wells outside the area were also used, but the supply was often deficient and sometimes brackish. Good drinking water was obtained from the fort, but only in limited quantities.

The McClellan Hospital was established in February, 1863, on the Germantown turnpike, four miles from Philadelphia, on ground which sloped gently and regularly to a neighboring creek. The pavilion buildings, 18 in number, radiated from a closed corridor 16 feet wide, which was laid in the form of an elongated figure with parallel sides and rounded ends. At the middle of its length, on one side, were the quarters of the medical officers, and on the other the kitchen and laundry, subsistence and quartermaster store-houses, engine-house and stable. The only building within the enclosure was that used for offices; it occupied the centre, and was connected by a transverse corridor with the main corridor on either side.

Each pavilion was 175×20 feet, 13 feet to the eaves and 18 to the apex of the roof. It contained 60 beds for patients, and had a space partitioned off at its attached end for use as dining-room and pantry and at its free end for wardmaster's room, lavatory, bath-room and water-closet. A car-track on the corridor facilitated the distribution

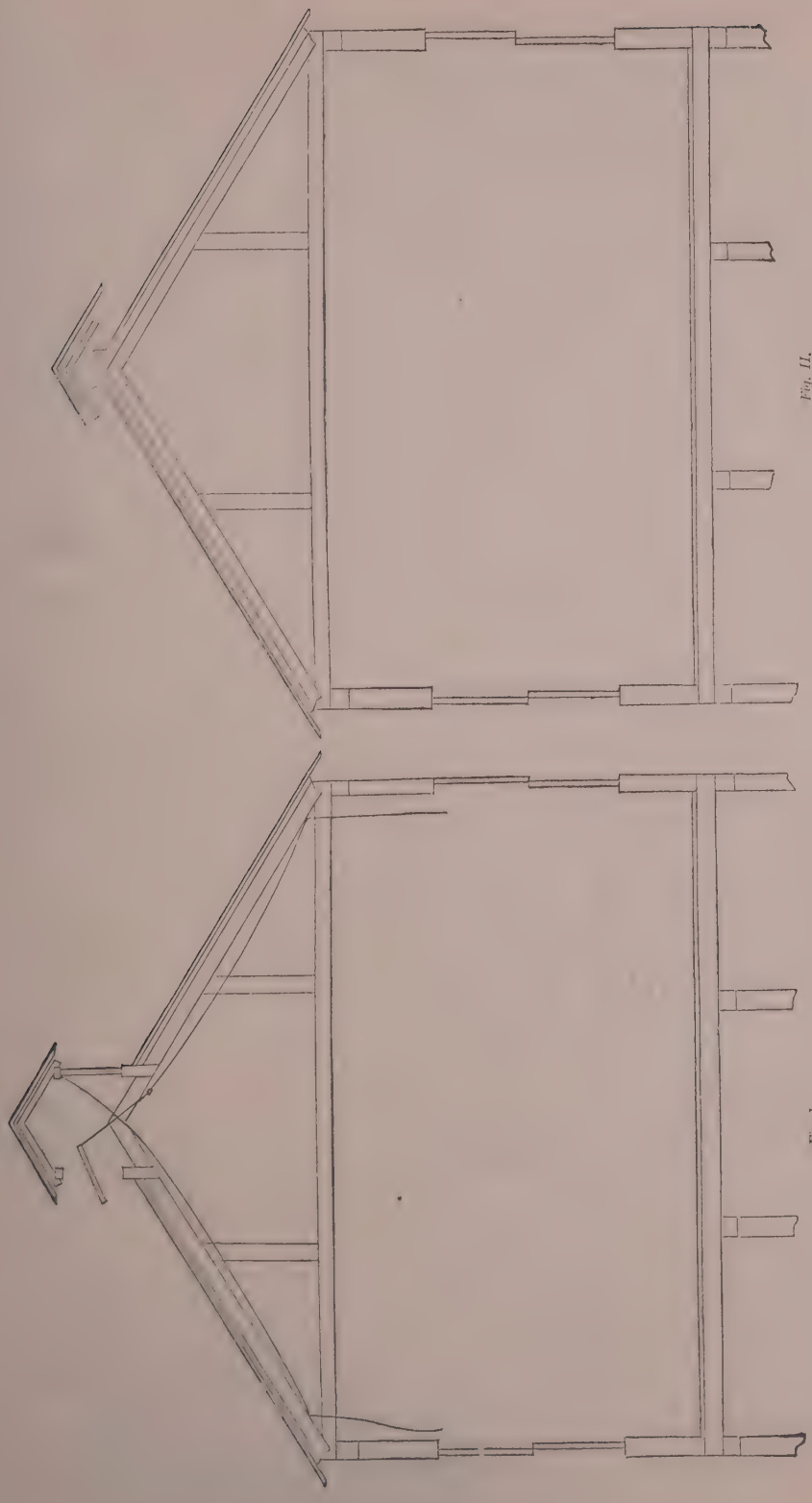


Fig. II.

Fig. I.

VENTILATION OF THE WARDS OF THE SATTERLEE HOSPITAL.

of food to the wards. The wards were ventilated by the ridge, the openings of which were closed when necessary by falling shutters. There were also apertures 8 inches square, opened or closed by sliding frames between the windows on the level of the floor, and channels of inflow for winter use under the floor opening near the stoves. The water-closet at the free end of the building was cut off from the ward by a transverse passageway; it was fitted with a cast-iron trough and water-supply. The closets communicated by four-inch pipes with a twelve-inch tile-pipe which surrounded the whole of the hospital buildings, and received as well the discharges from the lavatories and bath-rooms. An inner circuit of twelve-inch sewer-pipe followed the course of the main corridor and received the outflow from the kitchen-sinks, laundry, wash-tubs and pantries. The 12-inch main connected at one end of the oval and emptied 150 yards beyond into a cess-pool 20 feet in diameter, the liquid overflow from which passed into the neighboring creek, while the solid accumulations were removed from time to time as required. The water-service was derived from the Germantown water-works on a requirement of 30 gallons a day for each inmate. Good water was also obtained, and largely used, from wells dug within the enclosure. Tanks heated by steam furnished hot water to all parts of the hospital. To meet danger from fire there was a 5-horse power force-pump with 2,000 feet of 2½-inch rubber hose and eight fire-plugs. Two large reserve tanks, holding 30,000 gallons, were placed over the main corridor on brick walls for the purpose of supplying an extra quantity of water should that from the mains be insufficient. Moreover, each ward had 20 feet of 1-inch hose with couplings for attachment to a small plug in the water-closet. Fire-axes and water-buckets were kept at hand in the dining-room. A well-organized fire-guard patrolled the premises at night. The Army Medical Museum contains a block-model of this hospital. Its plans have already been published.*

The Mower Hospital, Chestnut Hill, Pa., was opened in December, 1862. It was situated on an elevated plateau near the village, about nine miles from Philadelphia. It consisted of fifty pavilions radiating, some at right angles and others more or less obliquely, from a corridor of a rectangular form with the angles rounded off. The corridor, 16 feet wide and 2,400 feet long, enclosed a space of seven acres, having the administration building in the centre connected with the circumference by a transverse corridor. A two-story pavilion, which projected from the middle of the short side of the parallelogram facing the railroad station, formed the entrance to the hospital. It contained a reception-room at its free end, with quarters for employés in the second story; the laundry occupied its attached extremity, and its prolongation into the enclosed area towards the administration building was the kitchen of the establishment. A corridor by the side of this long building led from the exterior of the hospital to the administration building in the interior of the enclosed space. Within the enclosure on one side of the kitchen were the buildings used as operating-room, butchers' shop, sutler's store and guard-house, and on the other those used as the general dining-room, carpenters' shop, chapel, etc. The kitchen, 110 × 30 feet, contained three large-sized hotel ranges, three London kitcheners, eight double-jacketed steam-kettles for soup and three large-sized cooking-stoves. The boiler-room, 29 feet square, accommodated two large boilers, a steam force-pump and fire-engine. The operating-room, 27 × 25 feet, was fitted with seats for one hundred persons, closets for instruments and dressings, shelves for medical works and cabinets for pathological preparations. Adjoining this room was the dead-house, 25 × 13 feet, arranged for convenience in *post-mortem* examinations, and having a vault 8 × 4 feet and 12 deep, with a windlass and dumb-waiter for the reception of bodies preparatory to burial. The chapel, 75 × 60 feet, connected with the main corridor by a covered passageway, was used as a reading-room on week-days, and contained a library of 2,400 volumes. In the angular spaces external to the pavilions, forming the rear line or posterior side of the rectangle, were two L-shaped buildings, used as store-rooms and as barracks for the Veteran Reserve Corps guard.

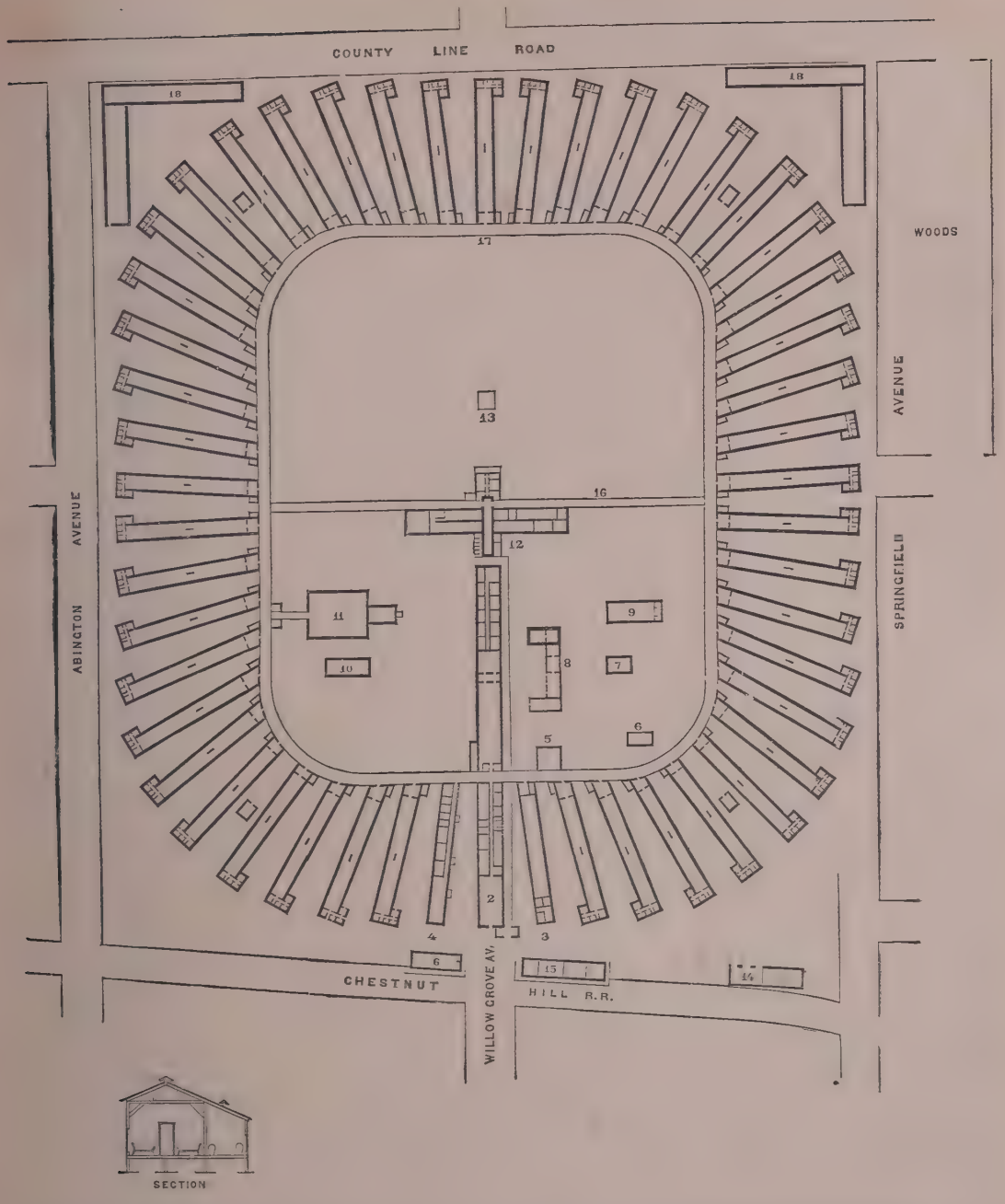
The pavilion on one side of the two-story building which formed the entrance of the hospital was used as a knapsack-room and as quarters for the band; that on the other side of the central pavilion was used for subsistence stores and as quarters for the stewards. Of the 50 pavilions there remained 47 which were put to use as wards. These were 20 feet apart at the corridor and 40 feet at their free ends. They were all well constructed, ventilated by the ridge, by four shafts connected with the stove-pipe by apertures near the floor-level, and inflow channels for winter use opening near the stoves. The water-closets at the free end were cut off from the ward by a passageway, affording cross ventilation; each had a trough 9 feet long and 12 inches wide, with five seats, a faucet for the inflow of water and a trap for its exit when necessary.

The water-supply was drawn from the Chestnut-Hill water-works into four tanks on the second story of the administration building and two at the junction of the transverse with the main corridor, the former having a capacity of 18,000 gallons each, the latter of 15,000 gallons each. A terra-cotta pipe 14 inches in diameter, following the track of the main corridor, carried off waste water from the sculleries of the wards and the buildings in the interior of the parallelogram. A brick sewer, 30 × 20 inches, following the curves of the free ends of the pavilions, received the discharges from the water-closets and bath-rooms, together with those from the pipe-drains. The outflow was into a creek about half a mile distant from the hospital. The arrangement of the buildings of this establishment is shown on the opposite page. The Army Medical Museum contains an excellent block-model on a scale of 30 feet to the inch.

Jefferson Hospital, Jeffersonville, Ind., *Medical Inspector* R. H. Coolidge, *U. S. Army, November*, 1862.—This hospital is situated on the north bank of the Ohio, about one mile east from the steamboat landing at Jeffersonville, Ind. Its immediate locality is elevated about fifty feet above the river, and, though originally uneven, has been graded and drained. The soil is a sandy alluvion mixed with clay.

The hospital in the general character of its construction and material resembles the Mower hospital, Chestnut Hill, Pa., from which, however, it differs in having the pavilions project from a circular instead of an ellipsoidal corridor, in having 25 instead of 50 pavilions, in having greater space between the pavilions and in many minor details.

*Pamphlet on the Representation of the Medical Department, U. S. Army, International Exhibition, Philadelphia, 1876.



GROUND-PLAN OF MOWER HOSPITAL, CHESTNUT HILL, PA.—Scale 195 feet to the inch: 1, 1, 1, 1, Wards: 2, Reception-room, laundry, etc. In the building between this and 12 is the kitchen, etc.; 3, Knapsack-room, band quarters, etc.; 4, Store-rooms, etc.; 5, Operating-room; 6, Butcher's shop; 7, Guard-house; 8, Boilers, coal, etc.; 9, Sutler's; 10, Carpenters' shop; 11, Chapel; 12, Administration building; 13, Ice-house; 14, 15, Railroad depots; 16, 17, Corridors; 18, 18, L-shaped buildings, used as barracks, store-rooms, etc.

All the buildings are of wood, with ridge ventilation.—the roofs of tarred cloth sanded: the only exception is a small brick building occupied by the surgeon in charge. The number and extent of its buildings may be stated as follows: 1. Administration building, 210 × 30 feet, two stories, divided into 65 rooms.—the lower story 13 feet and the upper 10 feet high in the clear: wings on the west side, two stories, 30 × 34 feet. 2. Operating-room in wing on east side of administration building, 30 × 34 feet, 15 feet high: it is lighted from the roof, supplied with hot and cold water, and has an ante-room and two small rooms, one on each side of the ante-room, for the reception of the dead. 3. Chapel and reading-room, 150 × 40 and 13 feet to eaves, with wings 24 × 16 × 10 feet. This was erected chiefly by the Sanitary

and Christian Commissions and by private contributions. 4. Kitchen, 150 × 30 × 13 feet. 5. General dining-room, 175 × 30 feet, two stories, the first 13, the second 10 feet high. 6. Commissary store-room, 175 × 20 × 13 feet. 7. Knapsack-room, guard-room and prison, 175 × 20 × 13 feet; the knapsack-room contains 2,240 suitable pigeon-holes and racks for as many guns. 8. Special-diet kitchen, 160 × 35 × 13. 9. Bakery, 40 × 34 × 12. 10. Sutler's store, 100 × 20 × 13. 11. Reservoirs, 56 × 56 feet, two stories, the first 35, the second 19 feet. 12. Laundry and engine-house,—the former 130 × 46 feet, two stories, 13 and 11 feet respectively, divided into eight rooms above and nine below; the latter one story, 60 × 20 × 13. 13. Barracks for guard, 172 × 24 × 10. 14. Officers' quarters, Veteran Reserve Corps, 36 × 31 × 10. 15. Ice-house; 16, Carpenters' shop; 17, Chicken-house; 18, Stables; 19, Hog-pens; 20, Twenty-four wards.

The administration building contains the offices, dispensary, store-rooms for medical supplies, mess-hall for officers, and 24 small rooms for quarters for officers and non-commissioned officers. The closed corridor from which the wards radiate is 16 feet wide and about 2,000 feet long; it has many large windows which admit of free ventilation. The enclosed circular area measures 600 feet in diameter and contains the administration building, officers' quarters, chapel, sutler's store, kitchen, etc. The kitchens are more complete than those of any hospital I have inspected. The general-diet kitchen is furnished with three ranges made by A. Litze of Cincinnati; eight eighty-five gallon caldrons, arranged for both steam and hot water; one hashing-machine with six cutters and revolving block, worked by steam; six coffee-boilers, copper, and six tea-cans of tin. The extra-diet kitchen has five forty-eight gallon caldrons, one range and one furnace for boiling. The arrangements for making coffee and tea are superior. The coffee-boilers are side by side on a stand and above them are two pipes, one for steam, the other for boiling water. The roasted and ground coffee is put into a covered percolator attached to the movable top of each boiler, the boiling water is poured on the coffee through a funnel and then steam is admitted from below; coffee for two thousand men can be made in a few minutes. Connected with this kitchen is a small steam-engine and two large boilers which supply the steam and hot water used in the kitchen and throughout the hospital. The laundry is situated nearer the river than the hospital. It is well furnished with washing-machines, wringers, drying-rooms for soiled and clean linen, and for mess-room and quarters for the laundresses and men employed. The washing-machines are worked by a small steam-engine, which also forces water from the river to the large tank-house, from which all parts of the hospital are supplied with cold water by pipes. The pavilions, arranged in radii, are 46 feet apart at the corridor and 80 feet at the distant extremities. The buildings used as general dining-room, subsistence store-room and knapsack-room, etc., also radiate from the corridor. Each pavilion is 175 × 20 feet, exclusive of the water-closet, bath-room and scullery, which project from the pavilion at each end; the height to the eaves is 13 feet and to the ridge 18 feet. Each ward is 150 feet long, the remaining 25 feet of the length of the pavilion being occupied at the end near the corridor by a room for nurses and a pantry; and at the other end by a wardmaster's room, a lavatory, a water-closet and a bath-room. The water-closets are cut off from the wards by cross-ventilated passageways.

The sides of the wards are plastered. Ventilation is by the ridge in summer and by ventilating shafts in winter. Seven of these shafts are arranged on either side of each ward, extending from the floor to the eaves, and thence transversely to the ridge, where the two shafts from opposite sides unite in a central vertical shaft which passes through the ridge and is properly capped; the only opening into these shafts is near the floor. Each ward is heated by four coal-stoves surrounded by an iron jacket. Fresh air is supplied by a transverse shaft running under the floor and opening near the stove. The wards are well lighted by windows on either side and by gas at night; the windows are fitted with brown linen shades. Each ward is furnished with iron bedsteads, besides tables and chairs.

The hospital is drained by two sewers, one of terra-cotta, running along the inner circle formed by the corridor, the other of brick, extending around the hospital on a line with the outer extremities of the wards; this system discharges into the river.

In the construction of this hospital the following defects may be noted: The ridge is too high and does not extend far enough laterally; the shutters have to be closed in rain or snow-storms. The roof has too great a pitch for a tarred cloth and a sand and gravel covering; shingles could have been supplied for about the same cost. The iron jackets surround the stoves so that the men cannot warm their feet, and the lower stratum of air fails to be heated; the jackets should only partly surround the stoves. There is no opening in the ventilating shafts save at the floor, so that in winter the ventilation must be imperfect unless portions of the ridge are left open. The stove-pipes do not connect with the ventilating shafts.

This hospital was commenced in September, 1863, and first occupied in February, 1864, though not then completed; indeed it is not yet finished. Its cost is computed at $250,000.

The improvements made in each succeeding hospital erected during the war had reference to the character of the construction of the wards, their lighting and ventilation, the attachment of their bath-rooms and water-closets and their arrangement as a whole, including their communication one with another and with the administration and executive departments of the hospital. Lining, lathing and plastering, flooring with close-set tongued and grooved boards, weather-boarding externally and shingled roofs gradually supplanted the coarsely joined and rudely finished paper-covered huts, which, at the McDougall Hospital, required external props to prevent their prostration by the wind. The pavilions suffered a reduction in length, as from 248 feet, with transverse partitions giving four wards at the De Camp Hospital, or 208 feet divided into two wards at the Stanton Hospital, to

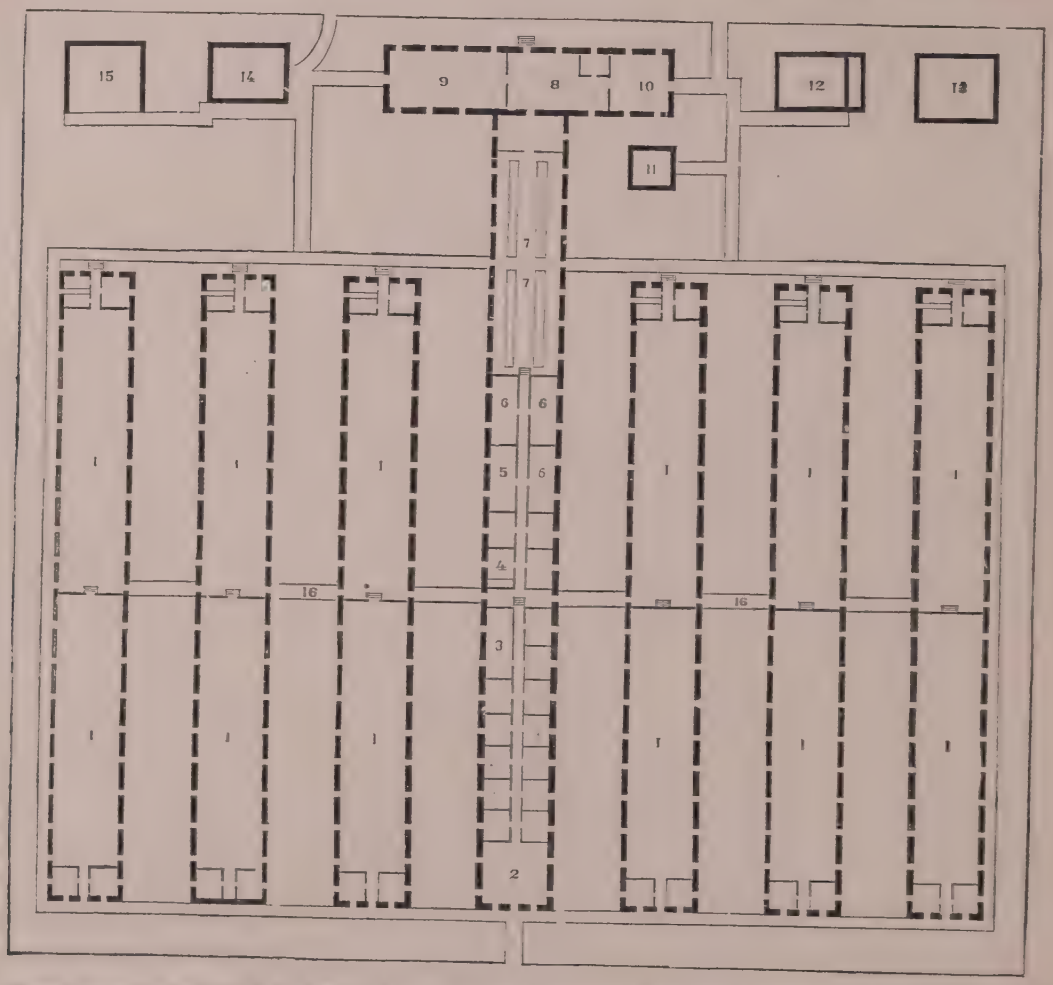
a clear ward length of about 150 feet in each building. The width and height of the wards became increased from 17½ and 8 feet, as at the McDOUGALL HOSPITAL to 24 or 25 and 12 or 14 feet respectively. The improvement in lighting may be seen by comparing the side elevation of the huts at Claysville, Maryland, page 908, with that shown on page 944. The open ridge, which admitted driving rains and snows, received protection, and other means of ventilation connected with the heating of the wards were introduced. Lastly, faults of aggregation were recognized and avoided. The plans of the CHESTER HOSPITAL, which set all considerations of fresh air at naught, were not duplicated. On the contrary, the narrow interspaces which at many hospitals besides the SATTERLEE were regarded as a source of danger in case of fire, had a tendency to become enlarged until, at the JEFFERSON HOSPITAL each hut, as has been seen, radiating from a circular enclosure, was at its free end separated from its neighbor by a space equal to four times its width and at its attachment to the corridor by a space more than twice its width.

The closed corridor, however, continued for a long time in every hospital plan to block up one end of the buildings and their interspaces, although the ARMORY and STANTON hospitals of Washington, D. C., built during the summer of 1862, showed that a covered pathway answered all the purposes for which a closed corridor was intended. It was, perhaps, the conversion of the corridor into a general dining-room at so many of the hospitals that ultimately caused its modification into a structure insusceptible of adaptation to undesirable uses. At all events, the covered walk, open at the sides, gradually displaced the enclosed corridor, thus giving better ventilation between the wards and a purer air in their interior from the side of the former corridor or mess-hall. At the STANTON and ARMORY hospitals the pavilions projected from one side of the covered walk. Economy of space and centralization of labor were obtained at these establishments at the expense of ventilation and with increased risks from fire; the buildings were too close together, considering their great length and inflammable material, particularly that of their roofing. At the NELSON HOSPITAL, Camp Nelson, Ky., built at a later date on a similar plan, the adjacent pavilions, although not so long as those of the Washington hospitals, were separated by a space of 35 feet.

At the HAMPTON HOSPITAL, Fort Monroe, Va., the pavilions were arranged *en echelon* in the form of a **V**, with the administration buildings, quarters and store-rooms closing in the triangle and the kitchen and dining-room in the enclosed space. As each pavilion in receding from the angle was disposed lengthwise behind and external to that in front of it, the length of the diverging series of wards was found to be an inconvenience. A similar inconvenience was experienced at the LOVELL HOSPITAL, Portsmouth Grove, R. I., where, on account of the nature of the ground, the pavilions were arranged in two lines, with a covered pathway along the middle of the wide avenue between them. At the HAREWOOD and LINCOLN hospitals, Washington, D. C., where the **V**-shaped plan obtained, the distance of each diverging line of wards from the administration building at the apex was reduced by making one pavilion overlap the other. The circular plan, with an open corridor, was used in the construction of the HAMMOND HOSPITAL at Point Lookout, Md.

STANTON HOSPITAL, WASHINGTON, D. C., occupied the square bounded by H and I, 2d and 3d streets. It consisted of seven long one-story pavilions placed parallel to each other and 24 feet apart, their northern ends, on I street, forming the front of the establishment. They were built of rough boards, lined with strong paper of a yellow color, well lighted by numerous windows, floored with white pine smoothly planed and well tongued and grooved, roofed with tarred roofing-felt, and ventilated by the ridge in summer and in winter by outlet shafts extending from near the floor to beyond the ridge, with inlets connected with the jacketing of the stoves. The central building, longer

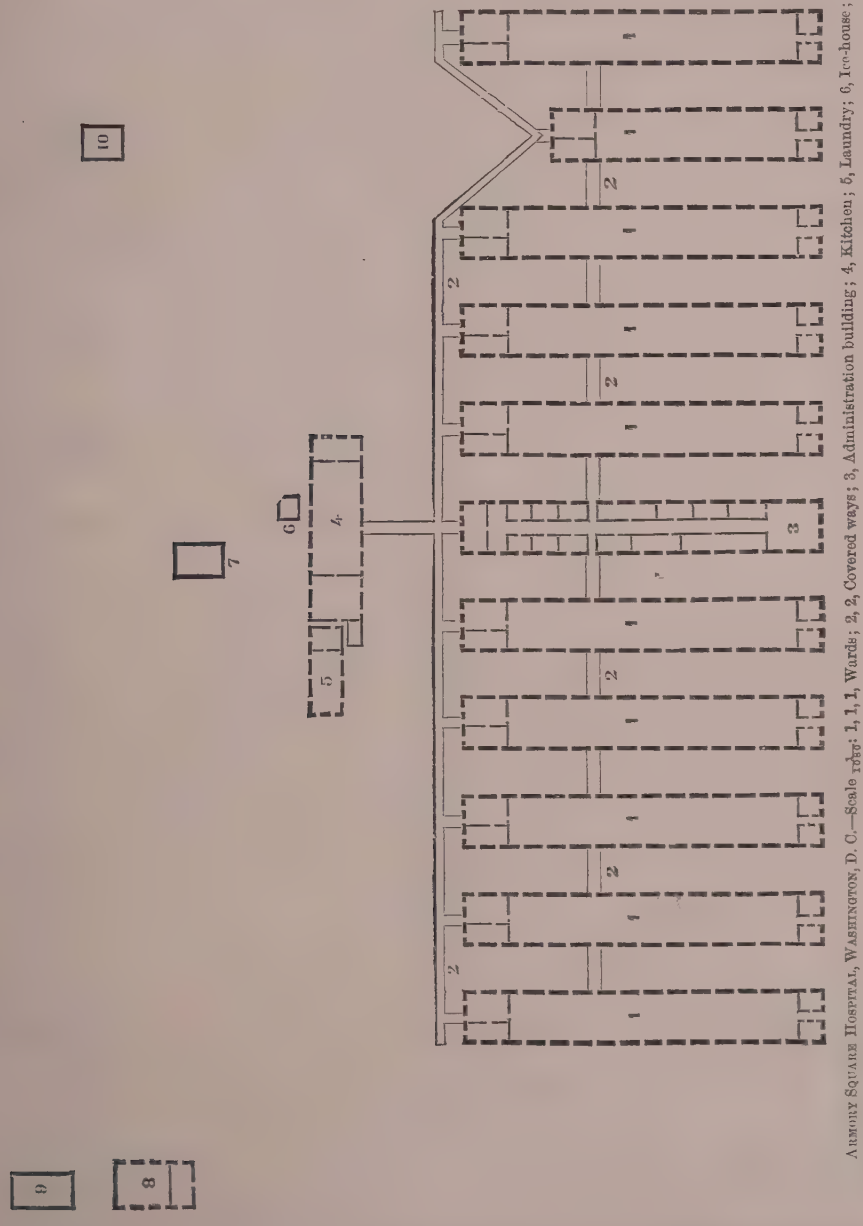
than the others, was used for administration purposes. The three pavilions on each side were each 208 × 24 feet, with an average height of about 14½ feet. They were each divided at the middle of their length by a partition, with communicating doors, into two wards of 36 beds each. At the free end of each ward two spaces 16 feet square were partitioned off, one used as a nurses' room, the other divided into bath-room and water-closets. The dining-room was in the rear portion of the administration building and had the kitchen and laundry at right angles to it posteriorly. A covered way surrounded the wards as a whole, extending continuously across the front and rear ends to the pavilions and on either side along the outer side of the building. A similarly protected pathway connected the pavilions in a transverse direction at the middle of their length where the division of each into two wards was effected. Water and gas were derived from the city mains. The water-closets were supplied with a stream of running water connecting with the general sewerage system.



Stanton Hospital, Washington, D. C.—1, Wards; 2, Administration; 3, Dispensary; 4, Bath-room; 5, Officers' mess; 6, Steward's mess; 7, Dining-room; 8, Kitchen; 9, Laundry; 10, Store-room; 11, Ice-house; 12, Stable; 13, Dead-house and knapsack-room; 14, Coal-house; 15, Guard-house; 16, Covered ways.

Armory Square Hospital, Washington, D. C., was constructed during the summer of 1862, after plans furnished by Ass't Surgeon J. J. Woodward, U. S. Army. It was situated on Seventh street opposite the grounds of the Smithsonian Institution, and just beyond the canal which, at that time, as an open sewer reeking with the filth of the city, rendered the location unwholesome. This site was selected on account of its proximity to the great thoroughfares and its easy access from the wharves and railroad depot. The hospital consisted of eleven long pavilions placed parallel to each other, with their gables facing the front and rear of the grounds. Adjacent pavilions were separated by a space no wider than the width of one of the buildings. The central pavilion constituted the administration building, the others, five on each side, were used as wards. The central building contained a reception room, from which a passage continued through the centre of the length of the building, with small rooms on either side used as the office of the surgeon in charge, the dispensary, general office, linen-room, post-office, store-room and officers' quarters and mess-room. In rear of the central building and connected with it by a covered way was the general kitchen,

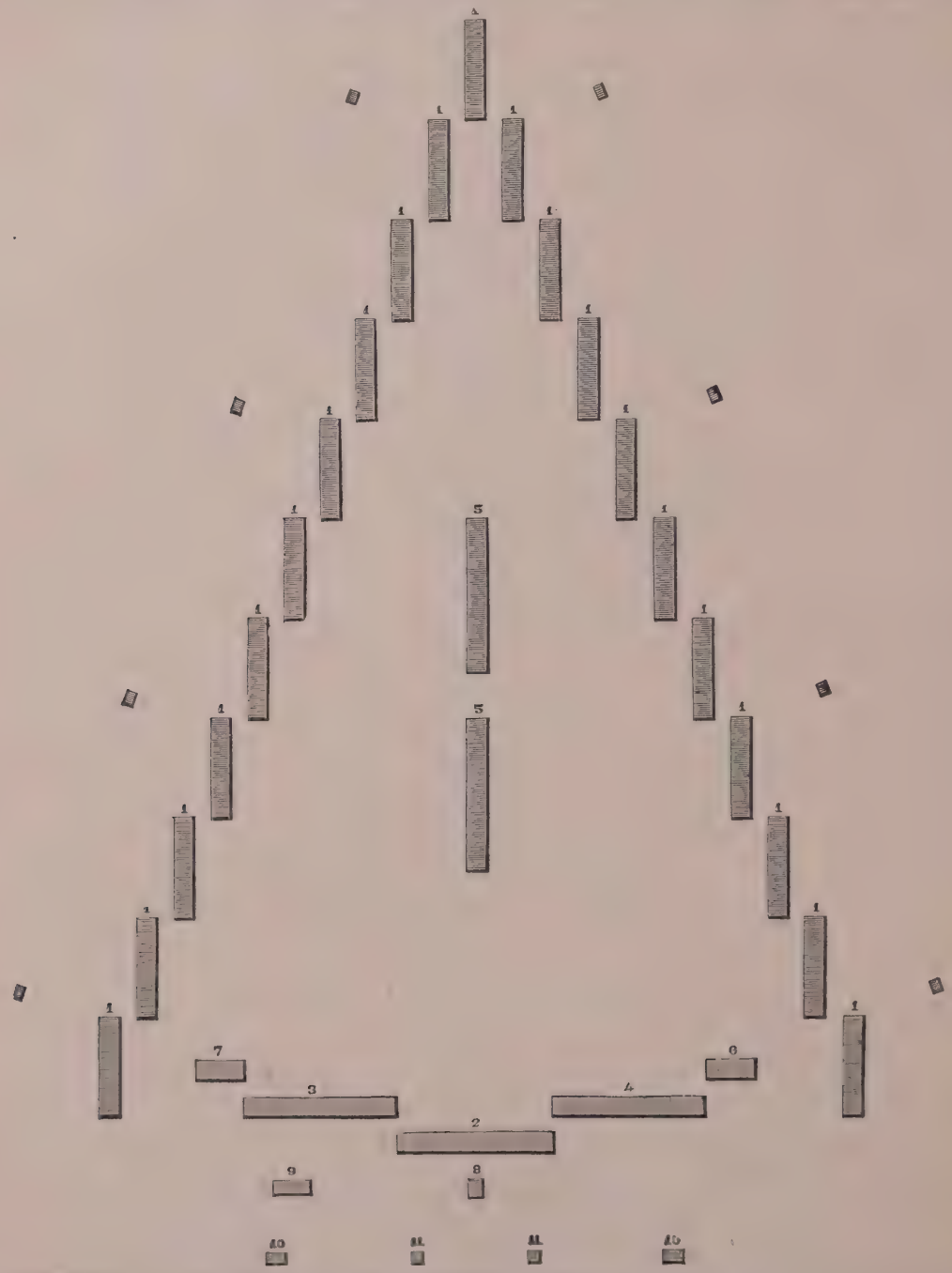
105 × 25 feet, and the laundry, 47 × 17 feet; a bakery, 36 × 16 feet, was a subsequent addition. On the right flank, near the stable and knapsack-room, see plan, a chapel and chaplain's quarters, rooms for female nurses and a dead-house were afterwards constructed. In rear of the kitchen and laundry, and between them and the guard-house, two barrack-buildings were erected, one for contrabands, the other for the guard. On the left flank of the hospital was the Columbian Arsenal, a three-story brick building 103 × 57 feet, the rooms of which were fitted up as wards to increase the



ARMORY SQUARE HOSPITAL, WASHINGTON, D. C.—Scale $\frac{1}{250}$: 1, 1, 1, Wards; 2, 2, Covered ways; 3, Administration building; 4, Kitchen; 5, Laundry; 6, Ice-house; 7, Coal-house; 8, Knapsack-room; 9, Stables; 10, Guard-house.

capacity of the hospital. Each pavilion-ward was 149 × 25 feet with an average height of about 13 feet, and accommodated 50 beds; one on the left of the line was somewhat shorter than the others on account of the position of neighboring buildings. A portion of the rear end of each ward was used as a dining-room: before separate quarters were provided for the female nurses this room was so partitioned as to afford them a lodging. At the other extremity of the ward were the bath-room, water-closet and wardmaster's room. The buildings were connected by a continuous covered-way along their rear and by transverse passages between adjacent wards near the middle of their length. The capacity of this hospital was occasionally increased by the use of tent-wards. Ventilation was by the ridge, shafts and floor-inlets, as was usual in the pavilions built at this period.

NELSON HOSPITAL, CAMP NELSON, KY., was situated on the Lexington and Danville turnpike, near Hickman Bridge on the Kentucky river, 20 miles south of Lexington, on a peninsula about a mile in diameter, formed by an almost circular sweep of the river. The face of the country at this point is broken and hilly, often abrupt and precipitous. The river-bank is faced by nearly perpendicular cliffs of limestone 10 to 400 feet high. The isthmus or landward side of the peninsula was strongly fortified and mounted with siege artillery; the surrounding farms, orchards, woodlands and commons constituted a picturesque and pleasing landscape. The grounds of the hospital comprised 6½ acres of the southeastern slope of the hillside. The buildings on this space, which was neatly fenced in, consisted of seven pavilion-wards and others necessarily associated with them. The wards were well-constructed wooden



HAMPTON HOSPITAL, NEAR FORT MONROE, VA.—1, Wards; 2, Administration building; 3, Commissioned officers; 4, Non-commissioned officers; 5, Kitchen and dining-rooms; 6, Guard-house; 7, Baggage-room; 8, Dead-house; 9, Stable; 10, Sinks; 11, Officers' sinks.

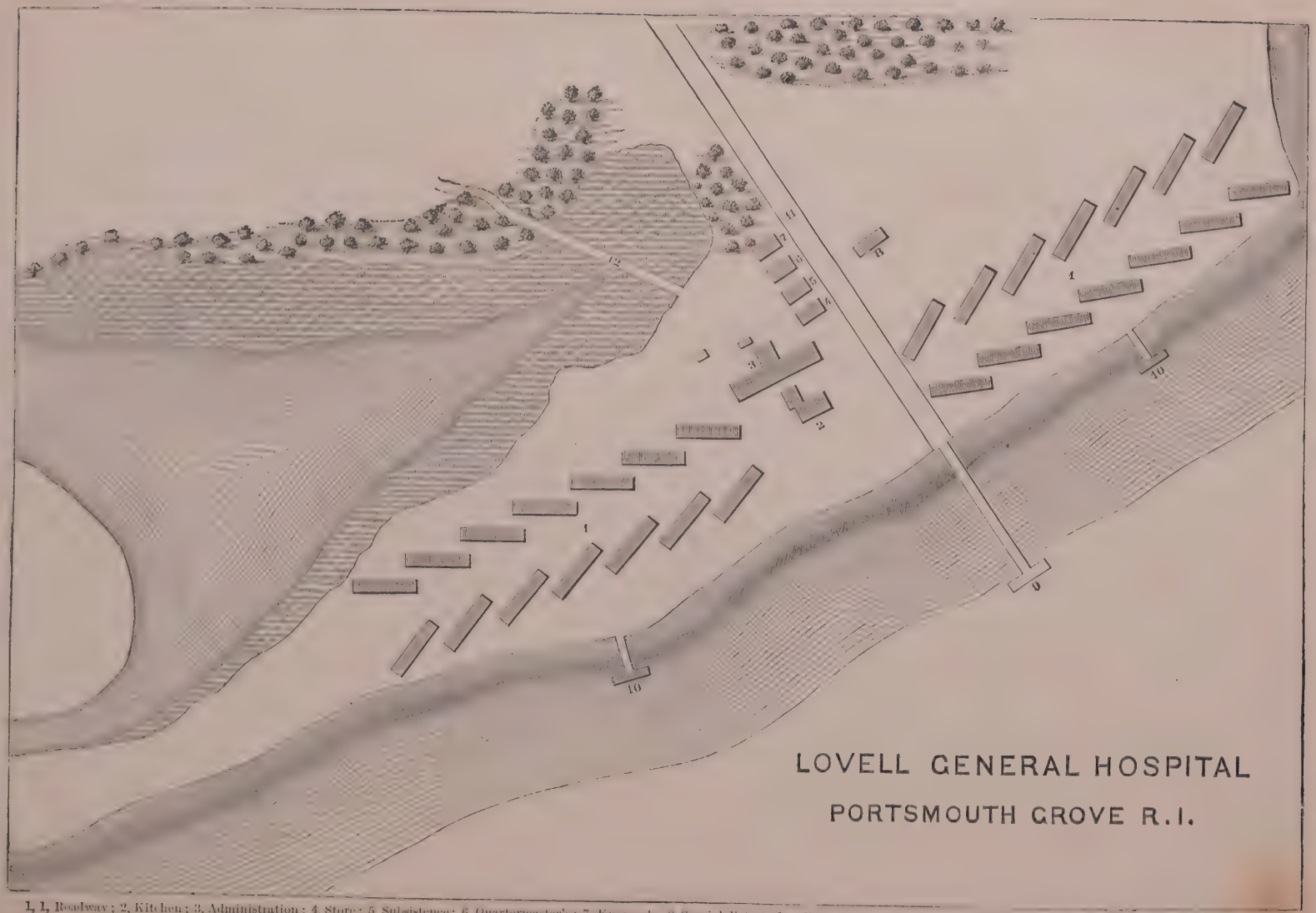
frames fronting southwest, with intervening avenues, 35 feet wide, ornamented with flower-beds. On account of the sloping site the buildings were elevated about 6 or 7 feet from the ground at one end. Each was 120 × 25 × 14 feet and contained 52 beds. They were ventilated by the ridge and base, and at one end had 11 feet partitioned off for use as lavatory, bath-room and water-closet. In front of each building was a wide piazza. A small side building to each ward, 18 × 12 × 10 feet, contained beds for five attendants. A two-story building, 76 × 24 × 16 feet, had on its first floor the office of the surgeon in charge, dispensary and dining-room, wardmaster's room and store-room, and on the second floor eight rooms occupied as quarters for chaplain, hospital stewards, sick officers, matrons, printing-office and library. One building, 80 × 20 × 8 feet, was used as a dining-room and pantry; another, 25 × 25 × 10 feet, as a full-diet kitchen, and another, somewhat larger, for special diet; these were well supplied with fixtures and furnishings. Other buildings were used as knapsack and baggage-rooms and for subsistence and quartermaster's stores. A steam-laundry was established in a two-story building, which also afforded quarters for the laundresses. About half a mile from the hospital proper was a two-story frame building, 50 × 40 feet, used for cases of measles and erysipelas, and for kitchen, dining-room and attendants' quarters. The "pest-house" for small-pox consisted of two isolated frame buildings each 100 × 16 × 10 feet and fitted for 50 patients; tents were used as officers' kitchen, quarters, etc. The supply of water, derived from the river, was pumped by steam into an elevated reservoir 100 × 100 × 11 feet, where it was subjected to filtration and afterwards distributed to all parts of this hospital, Camp Nelson and the Convalescent camp. Besides these buildings, tent-wards were pitched for the use of the U. S. colored troops rendezvousing at Camp Nelson. An excellent hospital-garden and an adjoining apple-orchard added much variety to the diet of the sick at this hospital.

The HAMPTON HOSPITAL was situated between Hampton creek and Mill creek, two miles from Fort Monroe, Va., on a nearly level plain ten feet above and nearly surrounded by tide-water. It was opened in August, 1862, and as originally planned and constructed consisted of 21 pavilions *en echelon*, in the form of a V; but since the sides of the adjacent buildings did not overlap, as in the Harewood and Lincoln hospitals, the length of each line was correspondingly extended and the difficulties of administration increased. Medical Inspector W. H. MUSSEY, U. S. Army, in October, 1862, objected to this hospital that "the distance of the wards from the kitchen renders, under the present system of distribution, the serving of warm food to the patients entirely impracticable—more especially will this be the case as the weather becomes colder. The arrangement of the buildings *en echelon* in the triangular form is not the best adapted to an efficient administration of affairs." Three large pavilions used as offices and officers' quarters, and some smaller buildings, connected the ends of the diverging lines of pavilion-wards and completed a triangular figure within which were the pavilions used as kitchens and dining-rooms. See illustration on opposite page.

At a later date the capacity of this hospital was largely increased by the erection of a line of pavilions beyond and parallel to the base of the original triangle. All these buildings were roughly constructed of boards coarsely joined. Those used as wards were 144 × 25 feet, 10 feet to the eaves and 20 to the ridge, containing 50 beds for patients and two small rooms at one end for the wardmaster, bath-rooms, etc. In addition to these a four-story brick building, formerly a young ladies' boarding-school, was used, with some attached pavilions, as an officers' hospital. There were also 400 hospital-tents and 60 wall-tents, which increased the hospital accommodation to nearly four thousand beds. The hospital was divided into forty-four wards which, for better government, were arranged in four divisions. There were seven offices, one general dispensary and one for each division, four store-rooms, four full-diet and four extra-diet kitchens, three knapsack-rooms, one dead-house, one *post-mortem* room, one chapel and one library and reading-room. A tent was used for an operating-room. There was no laundry, as washing was done out of the hospital by contrabands. The water-supply was raised by a steam-engine for distribution. The brick building was provided with water-closets, but water-tight boxes requiring frequent cleaning and disinfection were used in the sinks connected with the pavilion and barrack wards.

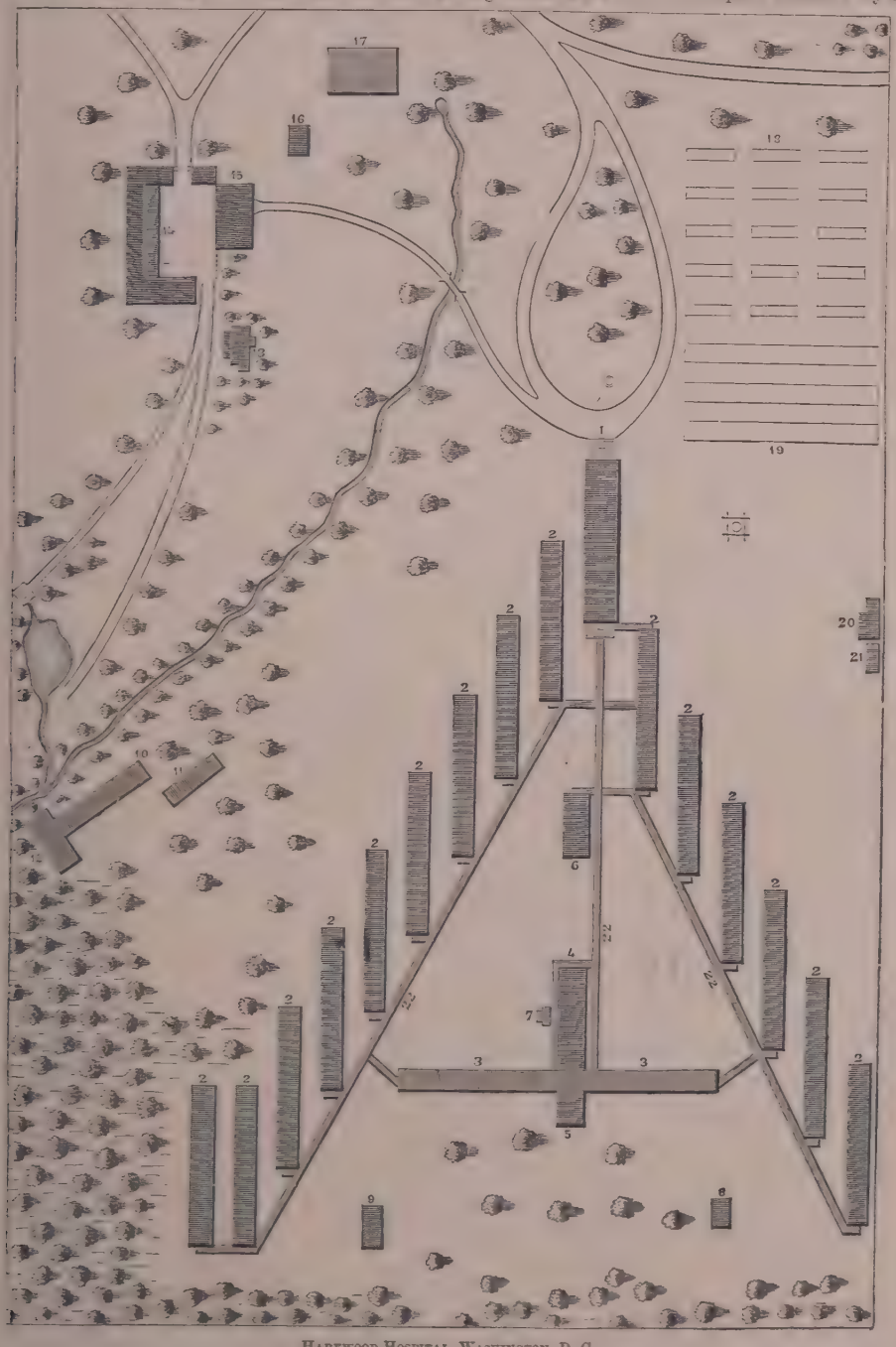
The LOVELL HOSPITAL, PORTSMOUTH GROVE, R. I., was built on low ground on the eastern shore of Narragansett Bay, eight miles north of Newport and twenty-three south of Providence. The grounds were bordered on the east by the Old Colony and Newport railroad, on which was a station with a side-track for the use of the hospital. There was a good wharf on the water-side at which vessels of 800 tons could discharge, but which could not be reached by the large steamers generally used for the transportation of the sick. The extension of the wharf was therefore frequently recommended. The grounds comprised about twelve acres, the largest diameter north and south, parallel with the bay. They sloped gradually from the centre, to the beach on one side and a low marsh on the other. About the middle of their length was situated the administration building, formerly a summer hotel, with, on either side of it, a series of fourteen pavilions, each series constituting a division of the hospital. A main avenue, 50 feet wide, ran north and south from the administration building, and along the sides of this avenue the pavilions were placed obliquely like the feathers on an arrow. A covered corridor, not shown in the illustration on the next page, with sliding-doors to close in winter, facilitated communication between the wards and the other buildings. The pavilions were 160 × 25 × 11 feet, and 19 feet 11 inches to the ridge. A space 15 feet long was partitioned off as high as the plate for bath-room, lavatory and water-closet at one end of each and for wardmaster's and nurses' rooms at the other; the remaining length of 130 feet accommodated 56 beds with about 50 feet of area and 900 of air-space to each. The water-supply was from a reservoir formed by damming a spring on a level 70 feet above the hospital. A general mess-hall, barracks for the guard, laundry, bakery, chapel, blacksmiths' shop, carpenters' shop, stables, etc., were subsequently added to the establishment.

The HAREWOOD HOSPITAL, WASHINGTON, D. C., was situated on what was known as the Corcoran farm on the Seventh street road, near the Soldiers' Home. The ground was gently rolling and diversified with woodlands and cultivated fields. The pavilions, of unplaned boards, were arranged *en echelon* in two lines, meeting at an acute angle,



1, 1, Roadway; 2, Kitchen; 3, Administration; 4, Store; 5, Subsistence; 6, Quartermaster's; 7, Knapsack; 8, Special diet; 9, Landing; 10, 10, Sinks; 11, Road to railroad; 12, Embanked roadway across marsh.

with the administration building placed lengthwise at this point. The wards in their position posterior and external to this building were parallel with it. Six were thus disposed on the right and rear of the administration building and nine on the other retiring line. The kitchens and dining-rooms were within the space bounded by the lines of



HAREWOOD HOSPITAL, WASHINGTON, D. C.

Scale $\frac{1}{720}$: 1, Administration building; 2, 2, 2, Wards; 3, Dining-room; 4, 5, Kitchen; 6, Knapsack-room; 7, Ice-house; 8, Dead-house; 9, Guard-house; 10, Laundry; 11, Laundresses' quarters; 12, Engine-room; 13, Quarters for female nurses; 14, Brick building used as bakery and commissary store-house; 15, Brick stable; the loft used as store-house; 16, Store-house; 17, Barn; 18, Hospital tents; 19, Old barracks; 20, Sutler; 21, Coal; 22, Covered pathway. Sinks in movable boxes placed on the flanks of the triangle.

the pavilions, and facilities were afforded for communication between the various buildings by means of covered footways. Each ward, 187×24×16 feet to the eaves and 20 feet to the ridge, contained 68 beds and was divided

transversely into two by a median partition with folding-doors. Ventilation was by the ridge, air-shafts, ventilating-slides and the windows. Water was pumped from wells into a distributing-tank, but the supply was insufficient for use in the water-closets. Sliding-boxes, cleansed every twenty-four hours, were used in the closet at the end of each ward, and special ventilators were provided to facilitate the escape of foul air. Pipe-drains carried off waste-water. The situation and conveniences of the establishment are better shown by the illustration on page 941 than by a lengthened description. At one period as many as 312 regulation hospital-tents were pitched on the grounds of this hospital. They were arranged in thirteen divisions, six pavilions to a division and four tents to each pavilion, which, as every tent accommodated six men, added 1,872 beds to the capacity of the establishment.

LINCOLN HOSPITAL, WASHINGTON, D. C., was opened December, 1862, about a mile east of the Capitol, on an undulating plain declining gently toward the Eastern Branch of the Potomac. Its pavilions were arranged in two lines *en echelon*, forming a V, with the kitchens, etc., in the space subtended by the lines; each wing consisted of ten pavilions. They were 187×24×16 feet to the eaves and 20 to the ridge, but, unlike those at HAREWOOD, they were not divided into two by a transverse partition. Ventilation was by the ridge, air-shafts and box-channels leading from floor-inlets. Each was fitted for 62 patients. At the exterior or distal end of each ward were four rooms occupying 15 feet of the length of the building and used for baths, sinks, clothing and nurses. By their opposite or interior ends the wards were connected with each other and the other buildings of the hospital by means of a covered pathway bearing a railroad track 2 feet wide, which was used to convey box-cars laden with food from the main and extra kitchens to the wards. Tent-wards were used at this hospital, four tents usually forming a pavilion. At one time 100 tents were in use. The water-supply was raised from wells to a distributing reservoir, and waste-water carried off by drains as at HAREWOOD. This hospital was described and its plan figured in Circular No. 6, War Department, Surgeon General's Office, Washington, D. C., 1865,* and again in an article published in connection with the International Exhibition of 1876.†

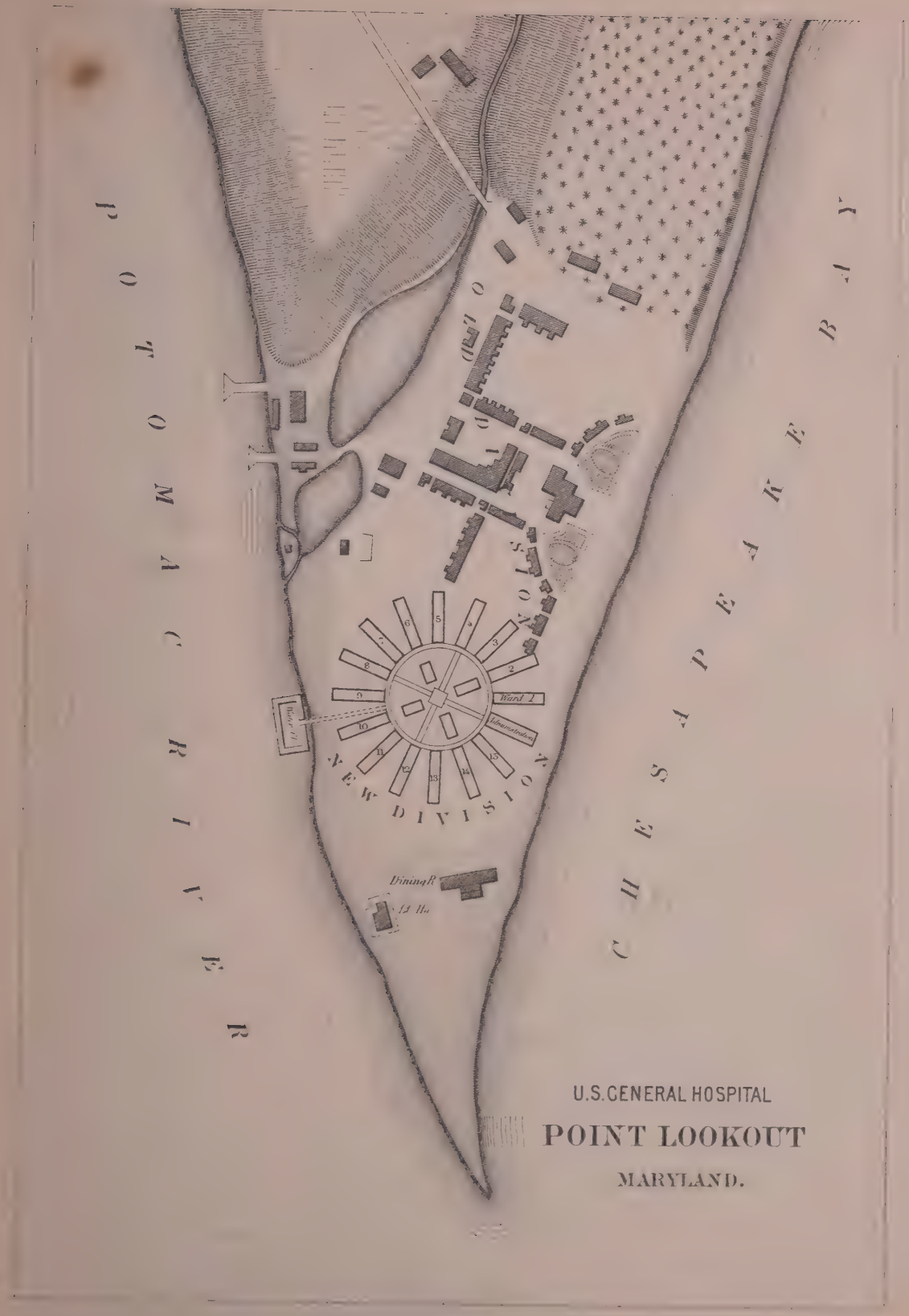
The HAMMOND HOSPITAL, POINT LOOKOUT, MD., was situated on a low, level and narrow peninsula, washed on one side by the waters of Chesapeake Bay and on the other by the Potomac River. The grounds, although formerly those of a summer hotel, had few shade-trees and but little verdure, so that the reflected heat from the white sandy surface was frequently oppressive in summer notwithstanding the generally prevailing breezes from the sea. In addition, the water-supply was not of good quality. Moreover, although Point Lookout was easy of access by water, special and expensive arrangements had to be made with the steamers plying on the river and bay for the transportation of its supplies, as it was not one of their regular stopping places. In fact the site possessed so few natural advantages that Medical Inspector JOHN WILSON, U. S. Army, in one of his reports regretted that so fine a hospital, with so good an outfit, had been there constructed.

When first established this hospital consisted of a small two-story summer hotel, its outbuildings and a number of cottages and hospital-tents. The hotel fronted Chesapeake Bay and had a series of cottages north and south from it and disposed in lines on its flanks. Altogether there were about a hundred buildings on the point, which afforded accommodation for 700 patients with an average of about 700 cubic feet of space for each, together with large halls for kitchen and general dining-room, laundry, store-houses, barracks for the guard, etc. But in the summer of 1862 it was decided to erect special buildings on the pavilion system. It was intended that there should be sixteen frame huts radiating from a circular roofed passageway, one of these to be used as an administration building and fifteen as wards, and four huts in the interior of the circle to be used as kitchen, laundry, guard-house and knapsack-room. The corridor, open at the sides, was to measure 1,001 feet along its outer circumference, with intervals of 36 feet between the attachment of adjacent buildings. The main building, to be used as dispensary, officers' quarters, etc., was planned to be 175×50 feet, two stories high. The wards were to be 175×25 feet interior measurement, with 14 feet to the eaves and 18 to the plate; space at the corridor end to be partitioned off for a dining-room and at the free end for lavatories and water-closets; walls weather-boarded externally; the floor of planed stuff, raised from 18 to 24 inches from the ground in every part; the roof of boards covered with felting and coal-tar well sprinkled with white sand; the windows of two sashes, both movable, and ventilation effected by a gap 16 inches wide along the whole length of the ridge, covered by a ridge roof 3 feet wide on each side and elevated six inches in the clear from the main roof, and by well-openings 8 inches in height closed or regulated by a slide on the inside and situated near the floor-level between the windows.

A, Section of ward; B, Transverse section of circular covered way; C, Transverse section of straight covered ways crossing the circular area; D, Side view of covered way.

The wards were finished in 1862 and were immediately occupied as dormitories, but the buildings in the interior of the circle made very slow progress. Medical Inspector JOS. K. BARNES, U. S. Army, reported in May, 1863, that

* *Reports on the Extent and Nature of the Materials available for the preparation of a Medical and Surgical History of the War of the Rebellion.*
† *Description of the Models of Hospitals*, Philadelphia, 1876.


POTOMAC RIVER
CHESAPEAKE BAY
OLD DIVISION
NEW DIVISION
Ward 1
Dining R
U.S. GENERAL HOSPITAL
POINT LOOKOUT
MARYLAND.

the modern part of this hospital was still incomplete in many of its essentials. "The kitchen, cooking-ranges and dining-halls are unfinished and the wards have neither lavatories nor bath-rooms, water-closets nor a water-supply. A capacious tank has been built, but the inflow and distributing pipes have not been put in and no work is being done on them, although the steam-engine and force-pump are in order." It does not appear that the water-supply was ever distributed to these wards; for in his report for June, 1865, Inspector WILSON stated that the pavilion-wards were not finished in accordance with the original plans. They were each 180 feet long and had partitioned off from their attached ends a room—the original dining-room—in which the clothes of patients were stored and their medicine and diet distributed; and from their free ends two rooms—the original bath-room and water-closet—which were used, one as quarters for the wardmaster and the other for the nurses. The length of the ward-room was 150 feet, which, with 70 beds, gave 1,028 cubic feet of space per bed. The two-story administration building on the eastern side of the circle, running toward the bay, was 200×40 feet. A hall 8 feet wide divided it along its length on the lower floor into offices, dispensary and store-rooms, and on the upper into quarters, mess-rooms and kitchens for the officers and stewards.

In the centre of the circle was a water-tank, elevated on a platform over a bath-room fitted with eight tubs and supplied with hot and cold water. This position of the bath-room was not regarded as satisfactory—patients requiring warm or hot baths were too much exposed in traversing the corridor; besides, the room was not well lighted, and frequent leaking from the superimposed tank kept its floor constantly wet. A general lavatory was arranged around the outside of the bath-room. The four buildings within the circle met at right angles at the tank. The chapel, 85 × 24 × 20 feet, was lathed and plastered, and fitted with an elevated stage at one end and seats for an audience of 400. The knapsack-room, 63 × 25 × 20 feet, was suitably supplied with racks and pegs; a post-office and room for the baggage-master was partitioned off at one end of this building. The extra-diet kitchen, 65 × 25 × 20 feet, was paved with bricks and suitably fitted; it contained a store-room and a room for the night-watchman. The general kitchen, in use prior to the building of the pavilion-wards, continued to supply full diet for convalescents in the cottages and other wards of the old hotel establishment. The fourth building, intended as a laundry, does not appear to have been put to use; in some of the reports it was called a reading-room. The laundry, established in one of the old buildings on the point, was partitioned off into a wash-room, drying-room, ironing-room and engine-room.

The water-supply was from six or seven wells about 12 feet deep. These yielded a sufficient quantity, but the water often caused irritation of the bowels in new comers. The surface drainage was imperfect on account of the flatness of the point. There were no sewers. Sinks were built over the Potomac river, on which the free ends of the western pavilions abutted. The plate facing page 942 shows the arrangement of the buildings on the point.

Most of the hospitals that have been thus briefly described were in active service at the close of the year ending June 30, 1864. But these were by no means all that had been organized. The list appended to this chapter gives the name and locality of many others of similar construction and arrangement that were then in use. The extensive experience gained by the Medical Department in the administration of these hospitals led to a recognition of faults and an appreciation of what was advantageous and desirable. The knowledge thus gained was embodied in a circular published by the Secretary of War for the information and guidance of the Quartermaster's Department, which, under the Regulations of the Army, was charged with the duty of providing hospital accommodation for the troops. This circular read as follows:

WAR DEPARTMENT, *July* 20, 1864.

The following instructions are promulgated for the information of officers charged with the construction of general hospitals, and will be deviated from only in cases of imperative necessity: Buildings will not be taken or occupied for hospital purposes until after full examination and approval by a medical inspector or other officer of the Medical Corps detailed for this purpose; and all alterations will be made in accordance with plans submitted by him and approved by the Surgeon General.

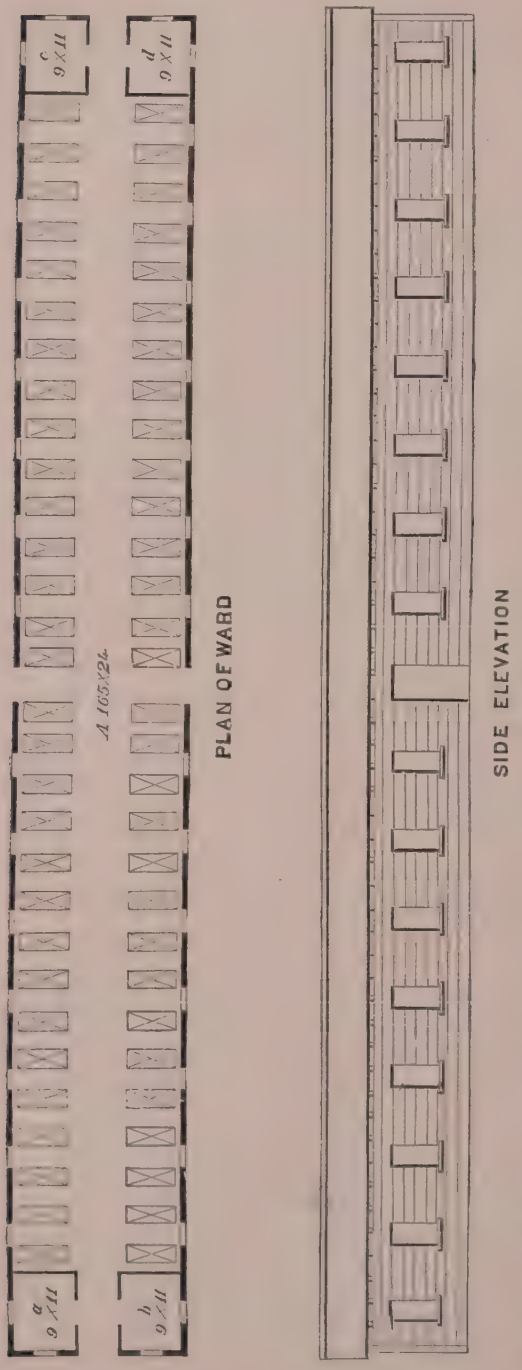
(Signed) E. M. STANTON,
Secretary of War.

Site.—The site of the hospital should be a well-drained plain, with a subsoil of gravel, and sufficiently extensive to accommodate the buildings. The situation should be elevated; as remote as possible from marshes or other sources of malaria, and must have a convenient supply of pure water.

Plan.—General hospitals will be constructed on the principle of detached pavilions, each ward being in a separate building, with beds for sixty patients. Besides the wards there will be detached buildings for each of the following purposes: General administration building, dining-room and kitchen for patients, dining-room and kitchen for officers, laundry, commissary and quartermaster's store-house, knapsack-house, guard-house, dead-house, quarters for female nurses, chapel, operating-room and stable. The wards, administration building, kitchens, dining-rooms and chapel are to be connected by covered walks which will have floors but no sides.

No general plan for the arrangement of the buildings can be directed, as the varying character and dimensions of sites render an uniform adherence to any one impracticable. Wards may be arranged *en echelon* in two converging lines, forming a V—in this case the administration building should be at the apex of the V, the other buildings

between the wings; or as radii from the periphery of a circle, ellipse or rounded oblong—in this case the administration building should be one of the radii, the other buildings within the enclosure; or parallel to each other—in this case the administration building should be in the centre of the row, the other buildings in the rear. Other plans may be rendered necessary by the special features of the ground. In any case the important points to be observed are to place the buildings far enough apart (at least thirty feet should intervene between two parallel buildings), and to locate them in such a manner that no one shall interfere with the ventilation of another. It is preferable to locate the wards so that the long diameter may run north and south or nearly so.



Each *ward* will be a ridge-ventilated pavilion, one hundred and eighty-seven by twenty-four (187 × 24) feet. At each extremity two small rooms, nine by eleven (9 × 11) feet, one on each side of the passage, six (6) feet wide, will be partitioned off. The space remaining for patients will be one hundred and sixty-five by twenty-four (165 × 24) feet. See figure, which gives the location of the beds and position of the doors and windows. The small rooms are occupied as follows: *a*, chief nurse; *b*, closet for medicines, etc.; *c*, bath-room; *d*, closet for close-stools.

The wards will be fourteen (14) feet high from floor to eaves—the pitch of the roof to vary in accordance to the materials composing it. The floor to be elevated at least eighteen (18) inches from the soil, with free ventilation beneath it. A ward thus constructed will accommodate sixty (60) patients, allowing more than one thousand (1,000) cubic feet of air-space to each. The number of wards will be regulated by the number of patients the hospital is intended to accommodate. A hospital of twelve hundred (1,200) will require twenty (20) wards.

Administration Building.—For a hospital of six to twelve hundred (600 to 1,200) beds this will be a ridge-ventilated building, thirty-eight by one hundred and thirty-two (38 × 132) feet and two stories high; the first fourteen (14) and the second twelve (12) feet high in the clear. This building contains the general office, office of surgeon in charge, linen- and store-rooms, dispensary, chaplain's office, lodging-rooms for officers, etc.

Dining-room and Kitchen for Patients.—The dining-room will be a ridge-ventilated building, large enough to seat a number equal to two-thirds the number of beds. The most convenient form is a long parallelogram, into which the kitchen opens in the centre of the long side. The kitchen will be divided into two unequal parts—the larger for the preparation of ordinary diet, the smaller for the extra diet—the cooking in both to be done on ranges. Where there is an engine steam may be advantageously used for boiling.

Dining-room and Kitchen for Officers.—A small building for this purpose will be situated near the administration building.

Laundry.—A building two stories high, with lodging for the laundresses on the second floor. The roof should be flat, with posts for stretching clothes-lines.

Commissary and Quartermaster Store-room.—A small two-story building, furnished with boxes and shelves for the various parts of the ration—having an ice-house connected with it for the preservation of meats and other perishable articles, and a room for clothing. The second story to contain lodging-rooms for the cooks.

Knapsack-house.—A building to receive the effects of the patients while in hospital. It will contain as many pigeon-holes, each two (2) feet square, as there are beds in the hospital.

Guard-house.—A detached building to lodge the guard, with a guard-room for prisoners.

Dead-house.—A small building containing two apartments, located so as not to be observed from the wards, and lighted by skylights.

Quarters for Female Nurses.—A detached building, containing lodging-rooms, dining-room and kitchen for the female nurses.

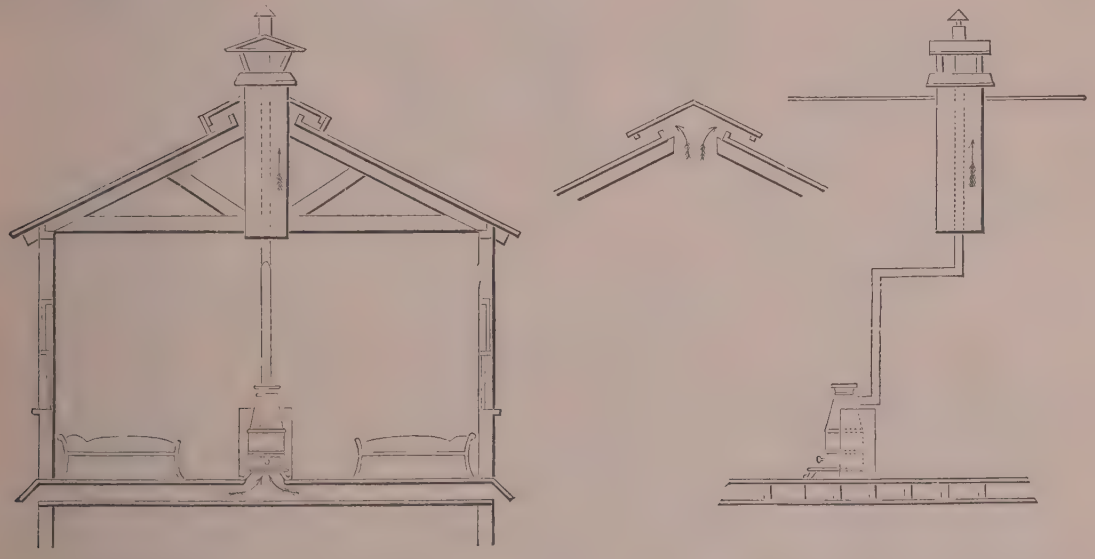
Chapel.—A detached building, fitted for the purpose of religious services, so arranged as to be used as a library and reading-room.

Operating-rooms.—Two rooms, each fifteen (15) feet square, one well lighted by skylights, the other by windows; the first for surgical operations, the second for discharge-boards, etc. It should be situated near the administration building.

Stable.—For ambulance and officers' horses.

Water-supply.—Where practicable, a large tank will be erected and kept supplied from wells or springs by pumps worked by a steam-engine. The engine, if possible, will be situated near the kitchen and laundry, in which case the steam may be made serviceable in cooking, and the power may be employed in working the washing- and mangling-machines.

Sinks.—Where the supply of water is adequate water-closets may be constructed in one of the small rooms in each ward; but where this is not the case privies will be built at a convenient distance from the wards, furnished with water-tight boxes, which must be emptied every night.



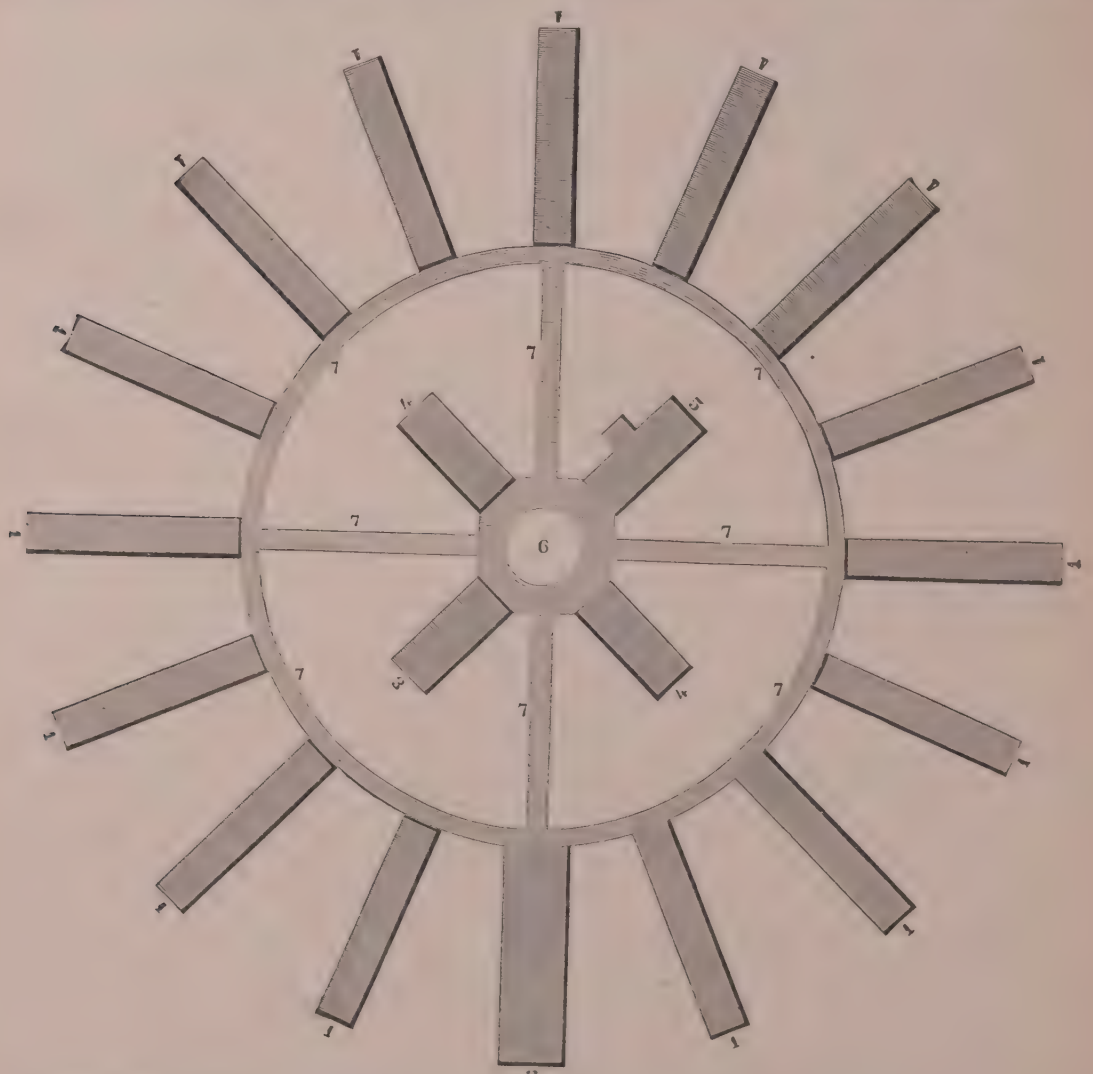
Ventilation.—During warm and mild weather the wards will be ventilated by the ridge, but during winter the ridge will be closed and ventilation by shafts substituted. Four stoves will be allowed to a ward, each partly surrounded by a jacket of zinc or sheet-iron, with an air-box opening beneath it to furnish the supply of fresh air. At eight (8) feet from the stove will be a shaft, properly capped, through which the stove-pipe will ascend. The shaft should be eighteen (18) inches square and should not come below the tie-beams.

The influence of this order was immediately felt, as may be observed by the following report on the CUMBERLAND HOSPITAL, Nashville, Tenn., by Medical Inspector R. H. COOLIDGE, U. S. Army. The Quartermaster's Department was about to replace the tent-wards hitherto used at this hospital by wooden buildings, when the publication of this circular caused a modification of the plans and elicited an explanation in regard to certain points which were not in conformity with its requirements.

The CUMBERLAND HOSPITAL, NASHVILLE, TENN., is situated on rolling ground on the Hillsboro' road, about one and a half miles west of the Capitol. It is composed of six hundred and fourteen tents, of which four hundred and thirty-three are hospital, fifty-seven wall and one hundred and twenty-four bell-tents. But in addition to these there are many shingle-roofed frame buildings, as for instance: Four division cook-houses, each containing a kitchen, pantry and dining-hall; three lavatories; one bath-house; one store-house for subsistence stores, clothing and knapsacks; one tool-house; one stable; one laundry; one special-diet kitchen; one dining-room and kitchen for medical officers; one operating-room; one dead-house and one office-building. The tents accommodate 2,600 patients, 222 attendants, 27 medical officers and 3 medical cadets. Water is obtained from the city water-works and from wells; the supply is insufficient, but the quartermaster is laying a six-inch main, which will afford an abundance.

The superficial drainage is excellent but the sewerage is deficient. This is about to be remedied. There are no water closets. Between the rows or streets of tents are small privies, the contents of which are drained by a sewer into a running branch which finally empties into the Cumberland river; but these sinks are not well supplied with water and are very objectionable. They will soon be removed.

I have not attempted an elaborate description of this hospital for the reason that it is now in a transition state. The Quartermaster's Department, having completed its various supply depots, is now turning its attention to the construction of hospitals, and has commenced building on this site pavilions for 2,200 beds. A large force is at work and three of the pavilions are nearly completed. The plans adopted were somewhat similar to those announced by the Secretary of War July 20, 1864, and since that order was received they have been modified so as to conform thereto as far as practicable, the principal differences being that each pavilion is to be surrounded by a covered porch, and that the width will be 22 instead of 24 feet. The quartermaster in charge informed me that he could not get timber of sufficient length to make the wards 24 feet wide, and that if he spliced the timber it would add very much to the cost and greatly retard the construction of the building.



SEDGWICK HOSPITAL, GREENVILLE, LA.—Scale 120 feet to the inch: 1, Wards; 2, Administration building; 3, Guard-house, knapsack-room and store-house; 4, Dining-rooms; 5, Kitchen; 6, Cistern; 7, Covered ways through which a railway runs with hand-cars for carrying food to the wards.

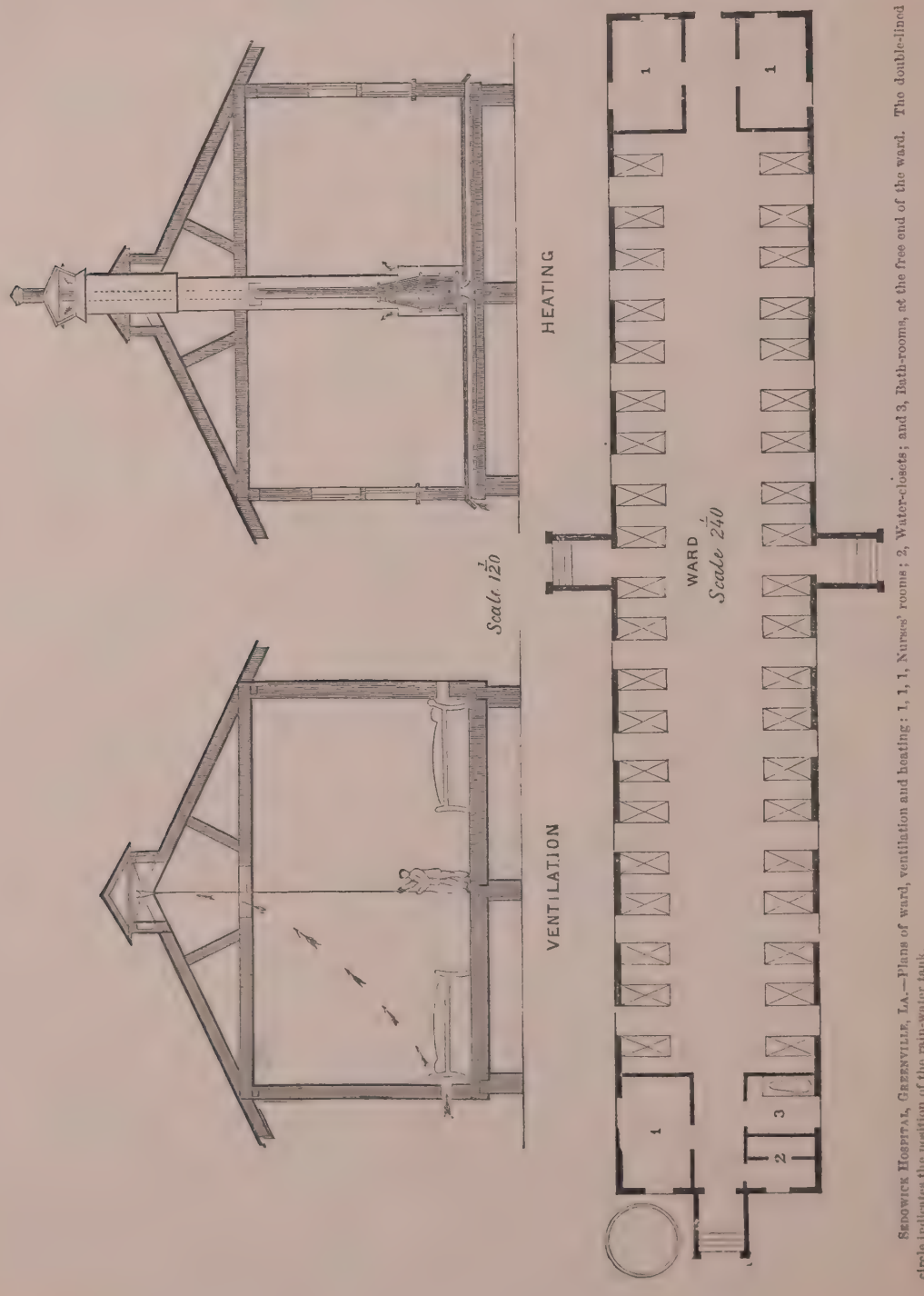
So many buildings had already been constructed or converted to hospital purposes in various parts of the country that but few were afterwards erected on the plans approved in this circular. The SEDGWICK HOSPITAL, Greenville, La., the HICKS, Baltimore, Md., and the SLOAN, Montpelier, Vt., were the most notable of these. The first was completed as a

hospital of 15 pavilions, radiating from a circular covered-way. The buildings were shorter than those suggested by the order of the Secretary of War, giving a clear ward length of only 115 feet, but the number of contained beds was proportionately diminished. The origi-

SEDGWICK HOSPITAL, GREENVILLE, LA.

GROUND PLAN OF KITCHEN.—Scale 10 feet to the inch: 1, Engine-house; 2, Boiler; 3, Engine and pump; 4 and 5, Store-rooms; 6, Boiling-kettles; 7, Carving-table; 8, 8, Tables for the delivery of food; 9, 9, Shelves; 10, Sink for washing dishes; 11, Extra-diet and roasting-range; 12, Garbage-box; 13, 13, 13, 13, 13, Rooms for cooks; 14, Railroad on which run hand-cars to carry food to the wards; 15, Steam-pipe to heat kettles and carving-table.

nal design for the second was a hospital of 36 wards, radiating from a circular covered walk; but the signs of approaching collapse on the part of the South stayed its progress to completion, leaving it a hospital of 18 wards attached to a pathway of a semicircular form. The last was designed as a hospital of 12 pavilion-wards with its administrative, executive



SEDGWICK HOSPITAL, GREENVILLE, LA.—Plans of ward, ventilation and heating: 1, 1, 1, Nurses' rooms; 2, Water-closets; and 3, Bath-rooms, at the free end of the ward. The double-lined circle indicates the position of the rain-water tank.

and other needful buildings radiating from an octagonal enclosure, bounded by a connecting covered-way, but the close of the war found it with four of its wards unbuilt and many of its accessories incomplete.

SEDGWICK HOSPITAL, GREENVILLE, LA., seven miles above New Orleans, was on a flat site on the east bank of the Mississippi, draining into the swamps between the river and Lake Pontchartrain. The grounds included about 30 acres; part was cultivated as a vegetable-garden for the hospital, the remainder, shaded by fine groves of live-oak, pecans, orange-trees, crape-myrtles and flowering shrubs, was traversed by shell-roads and winding pathways. The hospital was composed of fifteen one-story pavilion-wards, 145 × 24 feet, and a two-story administration building of the same length but 40 feet wide, radiating from the periphery of a circular covered-way.

They were constructed of boards set upright and battened, the roofs shingled and open at the ridge for ventilation. They were raised three feet from the ground on brick piers. Each pavilion had two small rooms partitioned from its inner end for the use of nurses and two from its outer end, one of which was used for nurses and the other divided into two for bath-room and water-closet. The ward-space was thus reduced to 115 feet, which, with the two beds between each pair of windows, gave 69 feet of floor-surface and 1,200 cubic feet of space to each of 40 beds. The corridor, 12 feet wide, was provided with a tramway and hand-cars to facilitate the distribution of food.

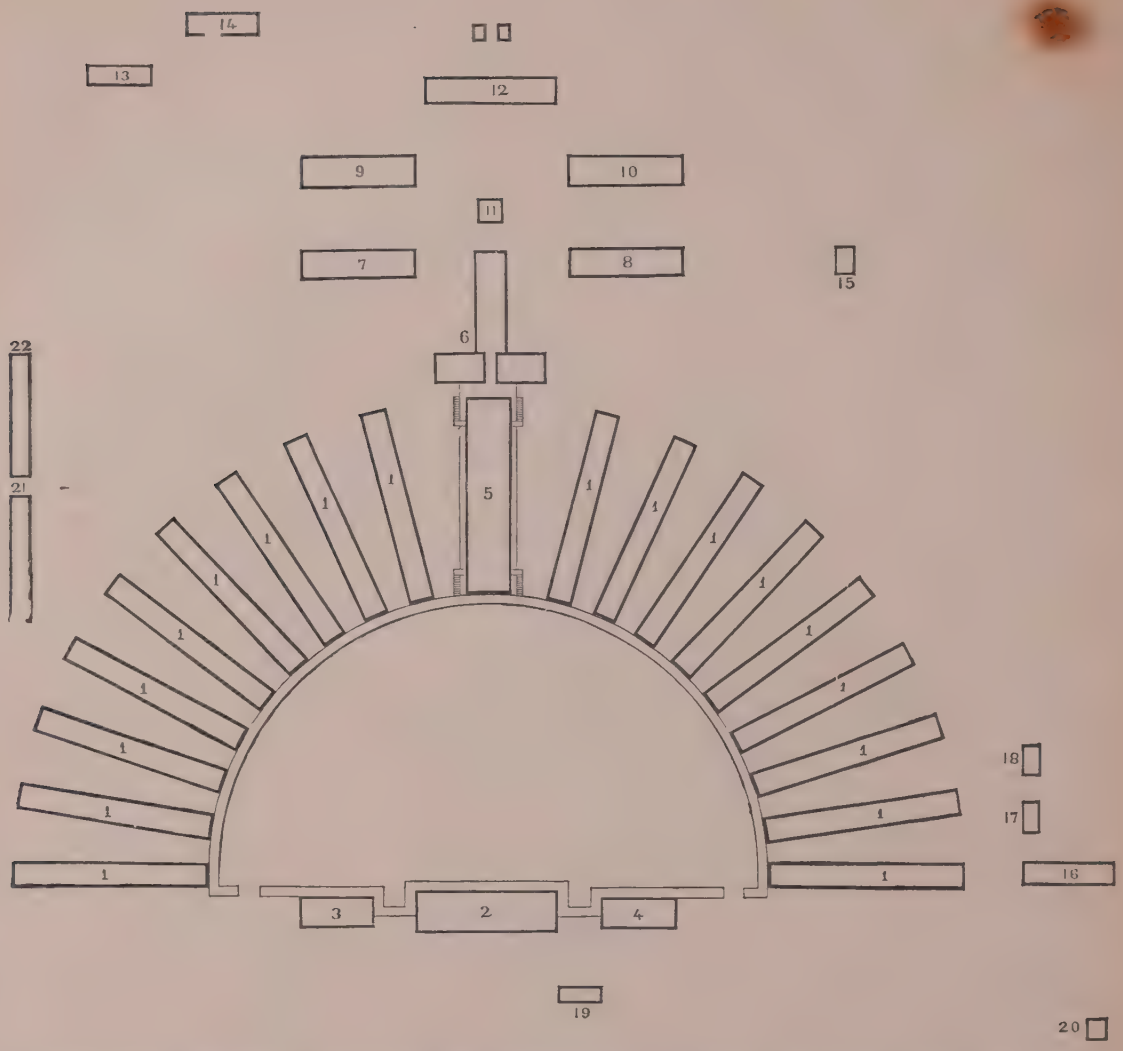
Two of the four buildings within the circle were used as dining-halls, one as kitchen and one as knapsack-room, store-house and guard-house. The kitchen, 80 × 30 feet, is shown on page 947. It contained a patent steam-cooking apparatus, extra-diet range, carving-table, store-rooms, bed-rooms, and a car-track continuous with that of the corridor. Outside the circle, at convenient distances, were detached buildings used as laundry, gas-house, bake-house, chapel, dead-house, stables, etc. Water for washing was obtained from a reservoir having a capacity of 320,000 gallons, on the river bank, whence it was distributed by pipes to the various buildings. Rain-water for drinking purposes was collected in a central cistern, which had a capacity of 150,000 gallons, and in small tanks holding 10,000 gallons each at the end of each ward. To perfect the surface-drainage the ground was graded from the centre of the circle to its periphery with a fall of one inch to every ten feet; surface-water was trapped into brick sewers which discharged into the swamps draining into the lake. The water-closets of the hospital were furnished with patent pans and discharged into brick sinks lined with cement; these sinks were connected with the sewers, into which their liquids drained.

The HICKS HOSPITAL, BALTIMORE, MD., was opened in June, 1865, in the western suburb of the city. The details of its construction were supervised by Surgeon THOMAS SIM, U. S. Vols. The original design contemplated a circular hospital on the War Department plan, with 36 radiating wards, each accommodating 60 patients, but the close of the war rendered its completion on this scale unnecessary; it thus became a hospital of 18 wards, projecting from the outer margin of a covered pathway or corridor having a semicircular plan. This was generally regarded as one of the best hospital establishments constructed during the war on account of the substantial character of its buildings and the many conveniences with which it was supplied.

The front of the hospital was formed by the administration building, which faced outwards in the centre of the straight line bounding the semicircular area. It was 132 × 38 feet and two stories high; the first floor contained the offices of the surgeon in charge, executive officer, quartermaster and commissary, the hospital library and printing-office, and the second the quarters of the medical officers. On its right was a building 70 × 28 feet, which contained the linen-room, post-office and officers' mess, and on its left a similar building containing the dispensary, medical store-rooms, room of the discharge-board, and an operating-room lighted from above. A covered pathway in rear of these buildings connected the ends of the semicircular corridor to which the wards were attached and closed in the unencumbered half-circle constituting the courtyard of the hospital.

The wards were built and ventilated as required by the War Department circular. The bath-rooms and water-closets were at the free extremity of each. The bath-room was furnished with a small stove and boiler for the supply of hot water. The water-closets contained troughs which were emptied and flushed several times daily into well-conditioned sewers. The water-supply was derived from the mains of the city. The wards were arranged along the convexity of the corridor, nine on each side of a central two-story building, which contained on its ground floor a dining-hall capable of seating 1,200 persons, and on its second floor, which was accessible by stairs from the outside, a chapel and dormitories for female nurses. In rear of this was a T shaped building, used as kitchen and laundry; the general kitchen, extra-diet kitchen and bakery occupied separate rooms containing suitable ranges, steam-fixtures and bake-ovens; the laundry had provision for drying by steam. Behind the kitchen was a tank-house and beyond this the quarters for the guard. On the right flank of the projecting wards and at suitable distances were buildings used as quarters for detailed men, workshops, subsistence store-room, stable and wagon-house and ward for contagious diseases; on the left were the knapsack and quartermaster's store-rooms, sutler's store and some houses used as quarters by medical officers and stewards. The guard-room and guard-house were in front of the line of the administration building, near the entrance to the hospital grounds. The Army Medical Museum contains an excellent model of this hospital.

The SLOAN HOSPITAL, MONTPELIER, VT., was situated about a mile from the town, on a plateau 150 feet above the level of the Onion river, and surrounded by high hills, spurs of the Green Mountain range. The buildings radiated from an octagonal central space, around the circumference of which was a covered platform or pathway connecting the whole. They were to have consisted of an executive building, four sets of officers' quarters, twelve wards, two mess-halls, a general and an extra-diet kitchen, subsistence store-room, laundry, water-tank, operating-room, dead-house, chapel and barracks for the Veteran Reserve Corps guard, but some of these buildings were never



GROUND PLAN OF HICKS HOSPITAL, BALTIMORE, MD.—Scale, 180 feet to the inch: 1, 1, 1, 1, Wards; 2, Administration building; 3, Linen-room; 4, Dispensary and operating-room; 5, Dining-hall; 6, Kitchen and laundry; 7, Ward for detailed men; 8, Knapsack-room; 9, Subsistence store-house; 10, Quartermaster's store-house; 11, Tank; 12, Quarters for the guard; 13, Stable; 14, Wagon-house; 15, Sutler's store; 16, Steward's quarters; 17, 18, Officers' quarters (of which there are several not shown on the plan); 19, Guard-room; 20, Guard-house near entrance-gate; 21, Workshop; 22, Contagion-ward,—this was more distant than is represented. The wards, dining-room and administration building are connected by a covered-way.

completed. Those erected were substantially built of wood, lathed and plastered, clap-boarded, shingled and provided with double floors. Only eight of twelve wards were finished for service. They varied in length, but all were 26 feet wide and 12 feet high, and each had 12 feet partitioned off from the free end for subdivision into ward-master's room and lavatory. Six had a length of 108 feet, which, with 40 beds each, gave a superficies of 62 feet and an air-space, including the triangle of the ridge, of about 1,000 feet; the two other wards measured only 104 feet in length. They were well lighted by windows on both sides and ventilated by the ridge and floor. Water was brought through wooden pipes from a spring in the neighboring hills. A receiving-tank, with a capacity of 40,000 gallons, distributed it to the wards. A room in the laundry building was intended to be fitted up as a general bath-room. There were no water-closets attached to the wards, but set off from the rear of each was a small privy which communicated directly with the drainage system of the hospital. This consisted of a drain 12 inches square, of three-inch spruce plank, which surrounded all the buildings and then passed under the privies for the reception of sewage matter. This drain discharged into a small brook in the valley and could be flushed at will from the tank. The method proved a failure; foul odors penetrated to the wards and caused its disuse.

In view of the order of the Secretary of War, submitted above, and of the brief account of so many of the hospitals already given, it is needless to enlarge upon any particular scheme of hospital construction and arrangement. The experience of the war was decidedly in favor

of the pavilion system, each pavilion constituting a single ward isolated from adjacent buildings by somewhat more than its own width, and connected by a covered walk with the other buildings of the hospital. In their aggregation this separation was effected, without removing any of the wards to an inconvenient distance from the administrative and executive buildings, by radiating them around some central point in a form to be determined by the configuration of the ground available for building.

But the plan of the pavilion-ward approved by the Secretary of War appears open to adverse criticism based upon the very experience which led to its adoption. Exception may be taken to it on two points—its length and the position of its water-closets.

The length of the pavilion as usually constructed was less than that recommended by the official circular. The latter assigned a length of 165 feet for 60 beds, but the advantage of this over 115 feet for 40 beds, as planned and carried out at the SEDGWICK HOSPITAL, may readily be questioned. The reports of our medical officers show a decided preference for a ward containing not over 50 beds. The experience of the British in the Crimea with similar pavilions was in favor of a ward containing only from 20 to 36 patients, as giving better ventilation and greater comfort and economy of labor than one of larger capacity.

It will be observed that the area per bed sanctioned by the official order was less than that allowed by the British regulations. Our long 60-bed ward gave an area of only 64 feet to each of its occupants; the British pavilion gave 87 feet, a ward for 20 men having been $72\frac{1}{2} \times 24 \times 14$ feet.

All the pavilion-wards built during the war had a space partitioned off at the free end, and generally also at the attached end, for use as a wardmaster's room, a pantry, bath-room and water-closets. Except in those great mistakes, the MOUNT PLEASANT and JUDICIARY SQUARE hospitals, at Washington, D. C., the water-closets were always at the free end of the building. In many of the hospitals they were attached to the lateral aspect of the pavilion at one of the angles of its free end and cut off from the interior of the ward by a hallway affording cross-ventilation. This was the arrangement adopted at the CUYLER, SUMMIT, MCCLELLAN, MOWER, TILTON and many other hospitals. It is illustrated in the accompanying figure, in which *a* is the interior of the ward; *b*, the water-closet; *c*, the lavatory and bath-room; *d*, the pantry; *e*, the wardmaster's room, and *f* the ventilating-hall and passageways. Even in some of the earliest pavilions, as in those of the DE CAMP HOSPITAL, David's Island, N. Y. Harbor, the water-closets at each end of the four wards into which the building was divided were separated by a passageway with cross-ventilation from the door communicating with the nearest ward. The official circular did not take cognizance of this arrangement, but recommended a method of direct communication between the ward and its water-closet. The ground on which this sanction was based does not appear on the records. It may have been argued that the cross-ventilation, obtained by placing the water-closet at the side and cutting off the bath-room and pantry by a transverse passage, was outweighed by the disadvantage of having one corner of the free end of the ward deprived of its window-light and ventilation. The interests of the patient occupying the bed in that corner were sacrificed by this method for the well-being of the majority. But these plans immediately suggest that the cross-ventilation could readily have been effected without injury to this corner of the ward by doing away with the side additions *b* and *c*, transferring the wardmaster's

room and pantry to the opposite end of the ward, and fitting up the cross-ventilated room *d* as a water-closet and *e* as a bath-room and lavatory. The arrangement would have afforded a better protection to the inmates of the ward from water-closet exhalations than that officially recognized. Or, to go further: The advisability of closing in the free end of the ward by service-rooms of any kind may be seriously questioned, as their apposition deprives that point of the building of all the advantages of exposure to sunlight and air which its position as a free end would otherwise confer upon it. A better site for the water-closet and bath-room of pavilions connected by a covered walk might have been found across the corridor from the attached end of the ward.

In other respects the War Department circular seems to have embodied all the advantages gathered by an extensive experience in the administration of large military hospitals.

Most of our pavilion-wards and their associated buildings were whitewashed externally, but the reflected glare was a source of so much discomfort that at some hospitals, as CAMP DENNISON, Ohio, and MAIN STREET, Covington, Ky., a yellow wash was substituted.

During the first summer of their use the wooden pavilions, open at the ridge, were conceived to fulfil all the requirements of a hospital-ward. The free communication with the external atmosphere furnished by the open ridge seemed to guarantee a purity of the air within, which, however, was not always found. The obvious explanation of this led immediately to the introduction of counter-openings along the wall near the level of the floor. These were provided with sliding-panels for closure in breezy or chilly weather, when the open ridge alone sufficed to give a free ventilation. But it frequently happened during the calm hot days of summer that, with all these provisions for the inlet and outflow of air, its stagnation in the wards was not overcome, and hospital gangrene occasionally appeared in pavilions crowded with wounded men. Some of the converted barrack-buildings of the CLIFFBURNE HOSPITAL, Washington, D. C., were thus visited. Apertures do not create a movement; they merely permit it to take place when forces naturally or artificially directed have called it into existence. When no aspiratory force operated as an exhaust at the ridge, and no material difference between the external and internal temperatures developed an inward current, the open ridge and floor apertures became for the time being valueless. In one of the Washington hospitals an effort was made to work fans by hand-power over any or all of the beds of a ward; but this was intended more for the comfort of the patients in sultry weather than as a method of artificial ventilation. At such times the tent-ward was regarded as better suited than the frame pavilion for hospital purposes. By looping up its sides the patients were practically moved into the open air, where diffusion and dilution took the place of ventilation. This was so well recognized that at most of the hospitals a tent-ward was set aside for the treatment of sloughing and gangrenous wounds.

But on the approach of winter the ridge had to be closed, as otherwise the ward became uncomfortably cold, and driving storms of wind and snow were free to penetrate. Its closure necessitated the introduction of special fresh-air inlets and ventilating-shafts and the utilization of the heat of the stove and stove-pipe. The inlets were boxed channels from the side walls opening beneath the stove, which was partially surrounded by a jacket of sheet-iron or zinc. The air, more or less warmed in its passage into the ward, became diffused and was ultimately drafted through a ventilating-shaft eighteen inches square, which extended from the level of the tie-beams to beyond the ridge. The stove-pipe, before penetrating the

shaft, traversed the length of the ward in a horizontal direction for about eight feet from its vertical connection with the stove.

On the whole this system of ventilation gave satisfactory results, although occasionally complaint was made that the entering air, insufficiently warmed in its transit, flooded the floor of the ward and chilled the feet of those who were not confined to bed. Dampers would have remedied this, but under the control of the patients they would have frequently obstructed all ventilation. Such complaints emanated mainly from wards in which the mistake had been made of running the ventilating-shaft from the floor upward. The stove-pipe entered this shaft at a height of eight feet and created through it a strong and steady draught which was felt as uncomfortable by all who were near its lower end. This fault at the JEFFERSON HOSPITAL, Jeffersonville, Ind., was aggravated by having the stove completely surrounded by a jacket of sheet-metal, which cut the men off from much heat that would have otherwise been radiated.

The water-supply of the hospitals varied with their locality. Those having free connection with the mains of a city-supply had usually an abundance of water except in a few instances of several-storied buildings or elevated sites, as at the CENTRAL PARK HOSPITAL, New York City, or the CITY HOSPITAL, St. Louis, Mo., where the water came only into the lower wards, leaving the upper to be supplied by tanks and force-pumps. Many of the larger hospitals, although freely connected with the city mains, kept on hand a reserve stock in large elevated cisterns chiefly as a provision in case of danger from fire,—the reserve cisterns at the MOWER HOSPITAL contained 102,000 gallons.

Those hospitals situated at a distance from any public water system were supplied from wells, springs, ponds and streams. When the source had a sufficient elevation the water was led directly into a distributing tank. The large hospital at PORTSMOUTH GROVE, R. I., derived all its water from a spring a quarter of a mile distant and elevated seventy feet above the hospital level; a reservoir was formed by damming the stream, and from this the water was brought to the hospital in pipes. When wells were used or water from a source having an insufficient elevation, steam was generally employed to raise the supply into a suitable distributing tank or cistern. When the local wells or springs proved insufficient, as was occasionally the case in some of the hospitals in the northern suburbs of Washington, water had to be brought in wagons from the nearest available source. Rain-water was sometimes used, as in Memphis, Tenn., and New Orleans, La.

The quality of the water was seldom questioned. At POINT LOOKOUT, Md., it was regarded as prone to cause diarrhœa. In a few instances exception was taken to the source of the supply—as at CAMP DENNISON, Ohio, where it was pumped from a mill-race fed by the Little Miami below the point where the drainage of the camp flowed into the river; at HENDERSONVILLE, Ky., where the intake from the Ohio was near a bank grossly covered with human filth; and at GERMANTOWN, Pa., where the supply was indirectly derived from a stream which was fouled by the drainage from factories and dyeing establishments.

The satisfactory disposal of excreta from the wards of these hospitals depended principally on the water-supply. Where this was ample, as when the hospital was freely connected with the mains of a city reservoir, the sewer connections were usually efficient. The questionable position of the water-closets in some of the pavilion-wards, and even in those officially sanctioned by the War Department, has already been noticed. In some hospitals the hopper-closet was used. In those thus fitted the water-closets were seldom offensive

except during some temporary interference with the flow of water. The water-closets on the upper floors of the hospital in CENTRAL PARK, New York, were frequently from this cause a source of complaint to the whole establishment. In others the seats were placed over a long iron trough through which a constant stream of water carried all deposited matters immediately to the sewers. But the necessity for economizing the water-supply caused the retention of the deposits in many of these troughs for several hours, the process of emptying and flushing taking place only so many times a day. The effluvium from water-closets of this class sometimes penetrated to the wards unless the closet itself was thoroughly ventilated and separated from the body of the building by a cross-ventilated passage. In some instances, as at MONTPELIER, Vt., wooden troughs in detached privies communicated with a rude sewerage system by means of a limited water-supply. The intention was to keep these troughs clear by occasional flushing, but the water-supply seldom permitted a realization of the anticipated success.

In hospitals with a defective water-supply boxes were used, sometimes in detached privies, sometimes even in the small rooms originally designed for a water-service. Of course these boxes, although emptied and cleaned with the utmost regularity and care, were of necessity a nuisance. Two instructive exceptions may, however, be noted, one at TURNER'S LANE, the other at the SUMMIT HOSPITAL, Philadelphia, Pa. Medical Inspector LE CONTE considered the ventilation of the privies of the former to have been the best of any in which the box-system was employed. Foul odors were carried off by flues which connected with special air-chambers heated by small stoves. "I have never," he says in one of his reports, "observed the least unpleasant odor even when the boxes most required to be emptied." At the SUMMIT HOSPITAL the box-privies attached to the side of one end of the pavilions were ventilated successfully by underground flues connected with the chimney of the engine-house. Our medical officers did not become familiar with the earth-closet until shortly after the war.

In some hospitals with a limited water-supply deep pits or vaults were used instead of movable boxes. These were more or less offensive in accordance with their position and the care taken in ventilating them and keeping them clean. CHESTER, Pa., furnished an illustration of the most offensive vaults, crowded as they were into the unventilated spaces between the long wards. The CRITTENDEN HOSPITAL, Louisville, Ky., had perhaps the best of these vaults, 30 feet deep, with the seats arranged on four sides of a high ventilating-shaft.

Besides the water-closets, privy-boxes or vaults attached to or in the immediate neighborhood of the wards, many of the hospitals had general sinks for the use of convalescents, guards, employés, etc. These were at some distance from the buildings. When the water-supply was ample, a trough containing a running stream carried the deposits to the sewers; when the supply was limited, the contents of the trough were flushed out at stated hours. At some hospitals favorably situated the latrines were erected over tidewater; at others movable boxes were used; at others, again, mostly small hospitals or large hospitals temporarily established, deep pits were used, which, when filled, were covered over and replaced by fresh excavations.

In cities the ultimate disposal of the excreta was effected by a communication with the general sewerage system; in other cases the sewers of the hospital found an outlet into some neighboring stream or tide-water; where no satisfactory outlet was obtainable the sewer terminated in a cesspool from which liquids percolated or overflowed by a suitable conduit into a natural incline leading from the hospital, and solids were removed from time

to time as they accumulated. The records of the general hospitals show but one outbreak of disease which was referred to faults of sewerage,—hospital gangrene and erysipelas occurred in one of the wards of the CUYLER HOSPITAL, Germantown, Pa. In June, 1864, there were ten cases of the former and four of the latter disease, and in July eight of the one and three of the other. A break in the sewer permitted extravasation into an old cesspool near the walls of the pavilion in question. No case occurred after this defect had been discovered and remedied.

In the early period of the history of these hospitals no efficient provision was made against danger from fire. Even as late as December, 1862, there was no effectual means of subduing fire at David's Island, New York, although the hospital contained at the time 2,146 beds and was beyond the reach of any municipal assistance. The means of guarding against this danger became a subject of special inquiry by inspectors, and in a short time each hospital endeavored to rival the others in the efficiency of its fire department. Had a fire attained any headway among pavilions covered with tarred paper and massed together as were those of the SATTERLEE and many other hospitals, it is hardly to be supposed that the engine and hose would have preserved the establishment: but the fire-drill and the fire-buckets and axes in every ward, by keeping constantly before the inmates the imminence of the danger, led to such precautions and vigilance that fire was either prevented or detected and suppressed in its incipiency. Every nurse on night duty was a guard against fire: but in addition there was at most hospitals a special fire patrol. Full buckets and axes were kept in each ward, which was also provided with a suitable length of 1-inch rubber hose for attachment to a plug in the water-closet. For general use 2½-inch hose, plugs in various localities and steam-power were available, with a reserve supply of water in tanks in case of accident. At large factory buildings in cities fire-escapes were built on the outside.

The personnel of these hospitals consisted of the surgeon in charge and his staff, including stewards, clerks, attendants, cooks, laundry-workers, etc., and guards.

The *surgeon in charge* was entrusted with full and complete military command over the persons and property connected with the hospital. He was held to a corresponding responsibility. In exceptional instances the administration of a general hospital was disturbed by the assumption of military officers temporarily in command in their neighborhood. Thus at one period, when the wards of the DE CAMP HOSPITAL, David's Island, New York Harbor, were filled with sick and wounded Confederate soldiers, an officer of a higher rank or grade than the surgeon in charge was sent in command of a detachment of troops to guard the island and prevent the escape of convalescent prisoners. The duty of this officer was so clearly indicated that there was no occasion for interference with the management of the general hospital; yet, by virtue of his superiority in rank, he assumed control over the disposition of the local guard of convalescents and Veteran Reserves, taking them from their regular assignments to relieve his own command and otherwise interfering with the authority of the surgeon in charge. In fact, for the time being the general hospital became converted into the post hospital of a military camp, subject to the orders of the commander of the camp, although nothing in *his* orders authorized this change in the status of the general hospital. Again, on the small peninsula which had Fort Schuyler on its water front and the MCDOUGALL HOSPITAL across its isthmus, there occurred at one time a conflict of authority. Originally the sentinels of the fort were placed at the foot of the glacis along the line of fence separating it from the hospital; but at a later date they were posted across the isthmus,

thus including the hospital within the limits of the fort and subjecting its personnel to a certain extent to a double system of military observances, one of which was unusual and unnecessary at a general hospital, and wholly unauthorized in the instance in question. An immediate appeal to higher authority was of course the proper remedy for an evil of this character.

At small hospitals the surgeon in charge was his own executive officer, but at large establishments an active and intelligent medical man was detailed to aid him in his supervision. The special duties of the *executive officer* were those of adjutant to a commanding officer. He had charge of the office and records, of the clerks and orderlies, supervised the preparation of all regular reports, promulgated all orders and conducted the general correspondence. He made appropriate distribution of patients received for admission, and looked after the general well-being of the establishment as aid to his superior. Daily and weekly reports were sent to the Medical Director of the Department; monthly reports to the Surgeon General and Adjutant General; bimonthly muster and pay-rolls to the Adjutant General and Paymaster; quarterly reports of property purchased with the hospital fund to the Surgeon General, and returns of camp and garrison equipage to the Quartermaster General; annual returns of medicines and hospital stores to the Surgeon General, and such other reports and papers as were from time to time required by superior authority. Among the books kept in this office were records of admission, such as a hospital register of sick and wounded, supplemented by an alphabetical register and an alphabetical register by States; records of casualties, as of deaths, discharges and transfers; records of strength present, as the Morning and Weekly Report Books; records of local government, as the Order-Book and accounts of hospital fund and hospital property; and records of correspondence, including a book of letters sent, of letters received, of letters from the Adjutant General's office, of letters from the Surgeon General's office and an endorsement book.

The *ward physicians* numbered on the average about one to every seventy-five patients; but the strength of the medical staff varied with the character of the cases received for treatment. Naturally convalescents and chronic cases in remote hospitals required less medical attention than the acute cases found in those near the theatre of war.

At every hospital a ward physician, detailed from the roster, did duty for twenty-four hours as *medical officer of the day*. This officer was required to be present and awake during the period of his detail. He admitted patients in the absence of the executive officer, and prescribed in cases of emergency in the absence of the ward surgeons. He inspected the meals to see that they corresponded with the official diet-table and were of good quality and well prepared. He visited each ward at 9 p. m. and again after midnight, to regulate lights and note the vigilance of the night attendants, and he enforced discipline, at all times exacting from patients, attendants, visitors, etc., a strict conformity to the rules prescribed for each respectively. He was also required to make, at the conclusion of this duty, a written report to the surgeon in command exhibiting the true condition of the hospital, and suggesting such measures of reform or improvement as seemed to him advisable.

The ward physician was responsible for the medical and surgical treatment of his patients, for the police of the ward, the care of its property and the faithful discharge of their duties by his subordinates. He was present at surgeon's call in the morning and afternoon, and visited his ward at such other times as was needful for the proper care of individual cases. He was required also to keep the diet and prescription book of his ward and to make

a record of all cases of professional interest. He sent a morning report to the executive officer stating all changes and recommending others, such as the return to duty, furlough, discharge or transfer to the Invalid Corps of particular individuals.

The ward, in the absence of the physician, was under the care of a *wardmaster*, who was responsible for the comfort, diet and medication of the patients, the performance of their duty by the nurses and the cleanliness and discipline of both. He was charged with the preservation of the ward property, the transfer and return of linen and clothing from the laundry, the police of the sinks, lavatory, baths and water-closets, and the regulation of the fires, lights and ventilation.

Young men, students of medicine, under the title of *medical cadets*, were occasionally employed as clerks and dressers under the immediate supervision of the ward physician.

Three or four *hospital stewards* were employed at each hospital. One had charge of the dispensary and medical property. One was frequently employed as quartermaster-sergeant, making issues of clothing, blankets, etc., on proper requisitions, and preserving an official record of his transactions. Another was generally in charge of the subsistence, drawing rations from the department, issuing to the kitchens and keeping the accounts of the hospital fund. Sometimes a hospital steward acted as chief wardmaster, thus relieving the dispensary steward of his property responsibilities.

A *chaplain* was attached to most of the large hospitals. In addition to duties of a purely spiritual character, this officer performed valuable service by keeping a record of special patients, with the post-office addresses of their nearest relatives, and writing letters for those who desired to communicate with their friends but were unable to do so on account of wounds, sickness or other causes. The chaplain had supervision over the postal service, the reading-room, library and cemetery.

The proportion of attendants, cooks and other employés varied exceedingly in these hospitals. Convalescents in a ward were frequently rated as nurses until they were able to bear the fatigues of active service. A good deal of trouble was sometimes experienced in getting satisfactory ward attendance. When details were made by superior authority from regiments in the neighborhood, the regimental commander generally complied with the order by sending broken-down men who, but for this call to service, would probably have been admitted to the same hospital as patients. Hired civilians were undesirable, as they often left at a moment's notice. Details from the Veteran Reserve Corps, serving as guard at the hospital, usually gave better satisfaction, as its ranks were recruited from those who had served an apprenticeship to ward duties in the character of patients.

It was the general opinion of officers in charge that one wardmaster and two able-bodied nurses were sufficient for a pavilion of 50 beds when the cases were not of an acute character; otherwise five nurses, with help from convalescents, might be required to perform the duties in a satisfactory manner. A hospital of 1,000 beds had therefore on its rolls 20 wardmasters and from 40 to 100 nurses. But besides these, 5 or 6 men were required in the kitchen as cooks and 8 or 10 as assistants, usually convalescents, to peel potatoes and turnips, pick fish, chop meat and wash dishes; the laundry required 4 or 5, with occasional helpers, for its management; the bakery 3 or 4; the blacksmiths', painters' and carpenters' shops and stables 10 or 15, and the dispensary, knapsack-room, quartermaster's, subsistence and hospital store-rooms as many more; the dead-house and cemetery 3 or 4; the headquarter office, including the library, about 10 men as clerks, messengers, etc.; and the quar-

ters and mess-rooms of the officers about 3 more, making a total of 120 to 200 employés. With able-bodied men specially enlisted for service in the medical corps this number would have been very materially reduced.*

Female nurses were borne on the rolls of many of the hospitals. At one time, in the WEST'S BUILDING, Baltimore, Md., 20 of 70 nurses were women; at STEWART'S MANSION 15 of 70, and at BEDLOE'S ISLAND, N. Y. Harbor, 10 of 70. These were frequently Sisters of Charity—40 served at SATTERLEE, 16 at POINT LOOKOUT and 15 at CLIFFBURNE. According to the testimony of all the medical officers who have referred to this point their best service was rendered in connection with extra diets, the linen-room and laundry. Male help was preferred in the wards, save in special cases of prostration and suffering where particular care was needful in the administration of dietetic or remedial agents. Sometimes, where no female aid was employed, female aid societies volunteered their services in superintending the extra diets and taking charge of the contribution room. At TURNER'S LANE and SOUTH STREET HOSPITALS, Philadelphia, Pa., a lady volunteer superintended the linen-room and extra diets. Another volunteer supervised the regularly appointed female nurses and had charge of the extra diets at CHESTER, Pa.

At first convalescents were detailed for *guard* and *general police duties*. This answered very well at remote hospitals, which were in reality barracks for convalescents and chronic invalids; but hospitals nearer the front could only have these duties performed by withholding the transfer to their regiments of men who were able for active service. Oftentimes at this period surgeons in charge were exposed to annoyances and their hospitals to irregularities which could neither be suppressed nor avoided for want of a police force. Afterwards one or more companies of the Veteran Reserve Corps were assigned to duty at each hospital. The senior officer of this command became responsible for the general police of the hospital grounds and the preservation of order within the limits of the command. Suitable fences around the grounds of a hospital reduced guard-duty to a minimum. At HAREWOOD, Washington, D. C., there was no fence around the extensive grounds, and although the guard was large, consisting of four companies of the Veteran Reserves, it was found impossible to prevent convalescents and others from eluding the vigilance of the sentinels and visiting the city, oftentimes to their great detriment. The officer of the Veteran Reserve Corps materially relieved the office of the surgeon in charge by supervising issues of cloth-

* Before this page passes from the hands of the compositor opportunity is taken to note the fact that the U. S. Army will soon be strengthened by a body of men such as is suggested in the text. The desirability of a trained corps of hospital nurses was well recognized during the war, but not until a quarter of a century later was legislative action obtained. The Act of Congress, approved March 1, 1887, authorized the enlistment of a special corps of men to be attached to the Medical Department, and to perform its duties under the orders and supervision of the officers of the department. This corps is now well advanced in its organization by special enlistments and promotions, after examination to determine the fitness of the candidates for its higher positions. The law provides one hospital steward for every post,—two, if the garrison consists of six companies, and one additional for every additional six companies; one acting hospital steward for each post, with privates at the rate of three for each post of one company, four for posts of two companies, with one man additional for each additional two companies. Moreover, four men of each company are designated for instruction as litter-bearers, to enable them to render temporary aid to the sick and wounded of their own organization, and from their ranks the privates of the hospital corps are recruited. Each post-surgeon is provided with an ambulance and harness, which must be at all times in good order and ready for service, and with hand-litters, cacolets, travois, and mule-litters as may be required. For war service the privates of the hospital corps will constitute two per cent. of the aggregate strength of the command, with an acting hospital steward to every ten privates and a steward to every thirty. They will perform the duties of litter-bearers, and serve with the ambulances at the primary dressing and ambulance stations and at the field hospitals of the command. For these duties they will be organized into a company for each brigade, with their stewards and acting stewards as non-commissioned officers, habitually camping near the field hospital to which they are attached. Ambulances are allowed in the proportion of one to a regiment of infantry of less than 200 men; two to a regiment of from 200 to 500 men; three to one of more than 500 men; one or two to a regiment of cavalry, according as it consists of less or more than 500 men, and one to a battery of artillery. The medical director exercises full control over this ambulance service. General hospitals will have six privates to every thirty beds, with as many hospital stewards and acting hospital stewards as may be required for efficient service. This allowance is ample, as may be seen by comparing it with the statements in the text. A railway hospital train of twenty cars, carrying six hundred sick and wounded, will be manned by two stewards, six acting stewards and one hundred privates; a hospital boat of three hundred beds will have three stewards, six acting stewards and sixty-five privates, and other cars and boats will have a proportionate allowance, varying, however, at the discretion of the medical director, according to the distance to be travelled and the character of the cases to be transported.

ing, preparing muster and pay-rolls, witnessing payments and closing up the personal accounts of patients on their death, discharge or transfer.

The *hospital fund* consisted of the credit on the books of the Subsistence Department for those parts of the ration which the sick men were unable to consume. The money-value of these articles, amounting monthly to very considerable sums, was applied to the purchase of delicacies for the extra-diet kitchen. Where hospital gardens were cultivated, as at NELSON, Ky., DENNISON, Ohio, and MADISON, Wis., or where the food-supply of the hospital was supplemented by fish caught by convalescents, as at PORTSMOUTH GROVE, R. I., the special diets were usually excellent. At other hospitals, where milk, eggs and chickens were scarce and correspondingly dear, the fund was sometimes inadequate. Transfers of a portion of the fund of a hospital in good circumstances to one not so favorably situated were occasionally made by order of the Surgeon General. Ignorance and want of economy on the part of the men detailed for duty as cooks often sapped the foundations of the hospital fund. Under such circumstances Surgeon L. A. EDWARDS, U. S. Army, realized a true economy at PORTSMOUTH GROVE in paying $80 a month from the fund to a professional cook for supervising the work of the kitchen.

At hospitals in urban districts the introduction of gas was a great convenience, but as the money-value of the ration of candles failed to pay the bills it was purchased at the expense of the diet of the sick. At CHESTER, Pa., for instance, the gas-bill for November, 1864, was $225.54, while the value of the candle ration amounted to only $59.16.

The *slush fund* was derived from the sale of bones, fat, stale bread, slops, flour barrels, straw, manure, waste paper, old newspapers, etc., and from the tax on the sutler. The amount of this fund varied at different hospitals, but it was always considerable. At the MCCLELLAN HOSPITAL it averaged $200 per month; at HAREWOOD $250; at DE CAMP $100. As the regulations did not take cognizance of a fund of this character, it was used for the purchase of such articles as in the opinion of the surgeon in charge seemed desirable for the general benefit. Most of the large hospitals provided excellent libraries for their patients in part out of this fund. The MCCLELLAN HOSPITAL, for instance, had 2,500 volumes besides pamphlets, and an average of forty-five daily papers, the weekly illustrated papers and monthly magazines; but much of this reading-matter was composed of gratuitous contributions. A melodeon for the chapel and instruments for a military band were purchased by many of the hospitals. The incidental expenses of lectures, concerts, theatrical and other entertainments on behalf of the patients were paid from this fund. Many hospitals supplied themselves with a printing-press, which was of use in the current work of the establishment, besides providing for the issue of a local paper under some appropriate title, such as the *Weekly Report*. But at some hospitals, where the hospital fund was inadequate to purchase the delicacies needful for the sick, this slush-fund was applied to supplement it. Usually the subsistence steward made the sales of the refuse matters which formed the basis of this fund, turning the money over to the hospital treasurer, generally one of the ward physicians, whose accounts were audited by a council of administration consisting of the three senior officers, exclusive of the surgeon in charge, on duty at the hospital.

The *mortality rate* of a hospital was sometimes quoted by the surgeon in charge as illustrating the healthfulness of its site and plan of construction or the efficiency of its management; but this rate depended so essentially on the character of the cases received for treatment that the influence of other conditions could seldom be expressed satisfactorily in

figures. At ARMORY SQUARE, Washington, D. C., the rate was 12.7 per cent. of the admissions. This hospital was for a long time used chiefly as a receiving depot for patients sent from the Army of the Potomac by the Alexandria, Va., railroad. All serious cases, including often men *in articulo mortis*, were retained; those capable of sustaining a continuance of the fatigues of travel were passed on to other hospitals. Hence the high rate of mortality. At MADISON, Wis., on the other hand, the rate was only 1.94. The inmates of this establishment were generally chronic cases or convalescents who had passed the dangerous period of their attack at some hospital near the front. These are extreme instances, but they illustrate the inutility of comparisons of this nature.

The extent of the hospital provision for the sick and wounded may be understood from the following list, which shows the capacity of the general hospitals on December 17, 1864:

DEPARTMENT OF WASHINGTON.

No.	NAME.	LOCALITY.	MEDICAL OFFICER IN CHARGE.	BEDS.	OCCUPIED.	VACANT.
1	Armory Square	Washington, D. C	Surgeon D. W. Bliss, U. S. V	1,000	690	310
2	Carver	Do.	Surgeon O. A. Judson, U. S. V	1,300	722	578
3	Campbell	Do.	Surgeon A. F. Sheldon, U. S. V	900	633	267
4	Columbian	Do.	Surgeon T. R. Crosby, U. S. V	844	538	306
5	Douglas	Do.	Ass't Surg. W. F. Norris, U. S. A	400	203	197
6	Emory	Do.	Surgeon N. R. Moseley, U. S. V	900	645	255
7	Finley	Do.	Surgeon G. L. Pancoast, U. S. V	1,061	755	306
8	Freedman	Do.	Act. Ass't Surg. A. R. Abbott, U. S. A	72	72	
9	Harewood	Do.	Surgeon R. B. Bontecou, U. S. V	2,000	1,207	793
10	Judiciary Square	Do.	Ass't Surg. E. Griswold, U. S. V	510	311	199
11	Kalorama	Do.	Act. Ass't Surg. R. I. Thomas, U. S. V	434	54	380
12	Lincoln	Do.	Ass't Surg. J. C. McKee, U. S. A	2,575	2,012	563
13	Mount Pleasant	Do.	Ass't Surg. H. Allen, U. S. A	1,618	898	720
14	Ricord	Do.	Surgeon C. W. Hornor, U. S. V	120	107	13
15	Stanton	Do.	Surgeon B. B. Wilson, U. S. V	420	266	154
16	Stone	Do.	Ass't Surg. P. Glennan, U. S. V	170	139	31
17	Seminary	Georgetown, D. C	Surgeon H. W. Ducachet, U. S. V	121	13	108
18	Augur	Near Alexandria, Va	Surgeon G. L. Sutton, U. S. V	668	403	265
19	Claremont	Alexandria, Va		164	34	130
20	L'Ouverture	Do.		717	617	100
21	1st Division	Do.	Surgeon E. Bentley, U. S. V	753	669	84
22	2d Division	Do.		993	856	137
23	3d Division	Do.		1,350	1,198	152
24	Fairfax Seminary	Virginia	Surgeon D. P. Smith, U. S. V	936	373	563
25	U. S. General	Point Lookout, Md	Surgeon A. Heger, U. S. A	1,400	450	950
				21,426	13,865	7,561

DEPARTMENT OF PENNSYLVANIA.

No.	NAME.	LOCALITY.	MEDICAL OFFICER IN CHARGE.	BEDS.	OCCUPIED.	VACANT.
1	Broad Street	Philadelphia, Pa	Ass't Surg. T. C. Brainerd, U. S. A	525	441	84
2	Citizens' Voluntary	Do.	Surgeon R. S. Kenderdine, U. S. V	236	48	188
3	Convalescent	Do.	Surgeon T. B. Reed, U. S. V	766	590	176
4	Haddington	Do.	Surgeon S. W. Gross, U. S. V	1,329	970	359
5	Islington	Do.	Act. Ass't Surg. J. V. Patterson, U. S. A	60	15	45
6	McClellan	Do.	Surgeon L. Taylor, U. S. A	1,089	1,089	
7	Mower	Do.	Surgeon J. Hopkinson, U. S. V	3,100	2,311	789
8	Satterlee	Do.	Surgeon I. I. Hayes, U. S. V	3,519	2,464	1,055
9	South Street	Do.	Act. Ass't Surg. R. J. Levis, U. S. A	288	288	
10	Summit House	Do.	Surgeon J. H. Taylor, U. S. V	1,204	845	359
11	Turner's Lane	Do.	Surgeon R. A. Christian, U. S. V	285	211	74
12	Officers'	Cammack Woods, Pa	Ass't Surg. S. A. Storrow, U. S. A	92	20	72
13	Chester	Chester, Pa	Surgeon T. H. Bache, U. S. V	878	536	342
14	Cuyler	Germantown, Pa	Ass't Surg. H. S. Schell, U. S. A	646	380	266
15	U. S. General	Pittsburgh, Pa	Surgeon Jas. Bryan, U. S. V	723	584	139
16	White Hall	White Hall, Pa	Ass't Surg. W. H. Forwood, U. S. A	1,369	776	593
17	York	York, Pa	Surgeon St. John W. Mintzer, U. S. V	1,600	1,005	595
18	Beverly	Beverly, N. J	Ass't Surg. C. Wagner, U. S. A	1,000	841	159
				18,709	13,412	5,297

DEPARTMENT OF THE OHIO.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	Brown	Louisville, Ky	Ass't Surg. B. E. Fryer, U. S. A	700	571	129
2	Clay	Do.	Surgeon F. Greene, U. S. V	178	137	41
3	Crittenden	Do.	Surgeon N. F. Marsh, U. S. V	360	356	4
4	Eruptive	Do.	Surgeon A. C. Swartzwelder, U. S. V	203	148	55
5	Foundry	Do.	Surgeon A. B. Prescott, U. S. V	200	106	94
6	Officers'	Do.	Surgeon C. McDermont, U. S. V	37	18	19
7	U. S. General	Ashland, Ky	Act. Ass't Surg. C. W. McMillan, U. S. A	275	106	169
8	U. S. General	Bowling Green, Ky	Act. Ass't Surg. H. G. Keefer, U. S. A	146	120	26
9	Main Street	Covington, Ky	Surgeon A. M. Speer, U. S. V	300	63	237
10	Seminary	Do.		218	54	164
11	Joe Holt	Jeffersonville, Ky	Surgeon H. P. Stearns, U. S. V	980	847	133
12	U. S. General	Lexington, Ky	Act. Ass't Surg. R. Peter, U. S. A	463	352	111
13	Nelson	Camp Nelson, Ky	Surgeon D. Meeker, U. S. V	700	555	145
14	Jefferson	Jeffersonville, Ind	Surgeon M. Goldsmith, U. S. V	2,399	2,265	134
15	No. 16	Do.	Ass't Surg. J. Gardner, 24th Ky. Vols	144	91	53
16	U. S. General	Knoxville, Tenn	Surgeon B. Barnum, 25th Mich. Vols	1,190	1,166	24
17	Officers'	Do.		42	15	27
				8,535	6,970	1,565

DEPARTMENT OF THE EAST.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	Ladies' Home	New York City, N. Y.	Surgeon A. B. Mott, U. S. V	402	345	57
2	St. Joseph	Do.	Surgeon B. A. Clements, U. S. A	325	229	96
3	Transit	Do.	Surgeon A. H. Hoff, U. S. V	62		62
4	David's Island	Do.	Ass't Surg. W. Webster, U. S. A	1,700	870	830
5	Ft. Columbus	Do.	Ass't Surg. P. S. Conner, U. S. A	100	19	81
6	Grant	Willet's Point, N. Y.	Surgeon A. H. Thurston, U. S. V	1,293	393	900
7	McDougall	Ft. Schuyler, N. Y.	Ass't Surg. S. H. Orton, U. S. A	1,184	506	678
8	Officers'	Bedloe's Island, N. Y.	Surgeon J. Simons, U. S. A	103	20	83
9	Albany	Albany, N. Y.	Ass't Surg. M. F. Cogswell, U. S. V	482	428	54
10	Buffalo	Buffalo, N. Y.	Dr. J. M. Brown	150	91	59
11	Sisters of Charity	Do.	Surgeon A. Crispell, U. S. V	200	69	131
12	Elmira	Elmira, N. Y.	Act. Ass't Surg. J. K. Stanchfield, U. S. A	325	231	94
13	St. Mary's	Rochester, N. Y.	Act. Ass't Surg. A. Backus, U. S. A	680	536	144
14	Troy	Troy, N. Y.	Surgeon G. H. Hubbard, U. S. V	300	219	81
15	Ward	Newark, N. J.	Ass't Surg. J. T. Calhoun, U. S. A	927	743	184
16	Knight	New Haven, Conn.	Surgeon P. A. Jewett, U. S. V	607	510	97
17	Webster	Manchester, N. H	Surgeon A. T. Watson, U. S. V	475	258	217
18	Brattleboro'	Brattleboro', Vt.	Surgeon E. E. Phelps, U. S. V	725	415	310
19	Baxter	Burlington, Vt.	Act. Ass't Surg. S. W. Thayer, jr., U. S. A	500	336	164
20	Sloan	Montpelier, Vt.	Surgeon H. Janes, U. S. V	469	421	48
21	Mason	Boston, Mass	Act. Ass't Surg. W. E. Townsend, U. S. A	60	59	1
22	Readville	Readville, Mass	Surgeon F. H. Gross, U. S. V	1,000	705	295
23	Dale	Worcester, Mass	Surgeon C. N. Chamberlain, U. S. V	480	370	110
24	Lovell	Portsmouth Grove, R. I.	Surgeon L. A. Edwards, U. S. A	1,464	713	751
25	Cony	Augusta, Me	Act. Ass't Surg. G. E. Brickett, U. S. A	816	816	
				14,829	9,302	5,527

NORTHERN DEPARTMENT.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	Officers'	Cincinnati, Ohio	Surgeon W. H. Goldbrecht, U. S. V	75	57	18
2	Marine	Do.	Surgeon N. Gay, U. S. V	122	112	10
3	Washington Park	Do.	Act. Ass't Surg. J. B. Smith, U. S. A	150	122	28
4	West End	Do.	Act. Ass't Surg. R. Bartholow, U. S. A	120	111	9
5	Seminary	Columbus, Ohio	Ass't Surg. G. Saal, U. S. V	150	145	5
6	Dennison	Camp Dennison, Ohio	Surgeon Wm. Varian, U. S. V	1,716	1,534	182
7	U. S. General	Camp Chase, Ohio	Surgeon S. S. Schultz, U. S. V	200	140	60
8	U. S. General	Cleveland, Ohio	Ass't Surg. G. M. Sternberg, U. S. A	330	259	71
9	U. S. General	Gallipolis, Ohio	Surgeon L. R. Stone, U. S. V	350	250	100
10	U. S. General	Evansville, Ind	Act. Ass't Surg. J. A. Jeancon, U. S. A	702	702	
11	U. S. General	Indianapolis, Ind	Act. Ass't Surg. J. M. Kitchen, U. S. A	256	240	16
12	U. S. General	New Albany, Ind	Surgeon Thomas W. Fry, U. S. V	860	838	22
13	Ohio	Do.	Act. Ass't Surg. J. A. Octerlony, U. S. A	300	268	32
14	Corps d'Afrique	Do.	Act. Ass't Surg. W. A. Clapp, U. S. A	146	114	32
15	Madison	Madison, Ind	Surgeon G. Grant, U. S. V	2,430	2,430	
16	Desmarres	Chicago, Ill	Surgeon J. S. Hildreth, U. S. V	150	129	21
17	Marine	Do.	Act. Ass't Surg. R. N. Isham, U. S. A	110	99	11
18	U. S. General	Quincy, Ill	Surgeon D. G. Brinton, U. S. V	950	891	59
19	U. S. General	Camp Butler, Ill	Act. Ass't Surg. Wm. Sturgis, U. S. A	525	525	
20	U. S. General	Camp Douglas, Ill	Surgeon J. C. Whitehill, U. S. V	137	127	10
21	Simons	Mound City, Ill	Surgeon H. Wardner, U. S. V	788	788	
22	Harper	Detroit, Mich	Act. Ass't Surg. D. O. Farrand, U. S. A	578	578	
23	St. Mary's	Do.	Act. Ass't Surg. W. H. Gorminger, U. S. A	276	276	
				11,421	10,735	686

MIDDLE DEPARTMENT.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	Convalescent	Baltimore, Md	Surgeon Thos. Sim, U. S. V	380	302	78
2	Jarvis	Do.	Ass't Surg. DeWitt C. Peters, U. S. A	1,213	959	254
3	National Hotel	Do.	Surgeon Z. E. Bliss, U. S. V	400	303	97
4	Newton University	Do.	Surgeon R. W. Pease, U. S. V	260	248	12
5	McKim's Mansion	Do.	Surgeon L. W. Read, U. S. V	300	213	87
6	West's Buildings	Do.	Surgeon A. Chapel, U. S. V	425	305	120
7	Division No. 1	Annapolis, Md	Surgeon B. A. Vanderkieft, U. S. V	1,562	1,545	17
8	Division No. 2	Do.	Surgeon G. S. Palmer, U. S. V	600	482	118
9	Officers'	Do.	Surgeon B. A. Vanderkieft, U. S. V	400	160	240
10	Annapolis Junction	Annapolis Junction	Ass't Surg. C. Bacon, U. S. A	290	273	17
11	Tilton	Wilmington, Del	Surgeon E. J. Baily, U. S. A	350	194	156
				6,189	4,993	1,196

DEPARTMENT OF THE NORTHWEST.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	Harvey	Madison, Wis	Surgeon H. Culbertson, U. S. V	592	592	
2	Swift	Prairie du Chien, Wis	Act. Ass't Surg. F. W. Kelly, U. S. A	290	160	130
3	U. S. General	Davenport, Iowa	Act. Ass't Surg. J. M. Adler, U. S. A	300	252	48
4	U. S. General	Keokuk, Iowa	Surgeon M. K. Taylor, U. S. V	1,350	1,030	320
				2,532	2,034	498

DEPARTMENT OF THE TENNESSEE.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	Overton	Memphis, Tenn	Ass't Surg. J. C. G. Happersett, U. S. A	450	326	124
2	Gayoso	Do.	Surgeon F. N. Burke, U. S. V	400	174	226
3	Adams	Do.	Ass't Surg. J. M. Study, U. S. V	500	305	195
4	Officers'	Do.		100	21	79
5	Old State Pest	Do.	Act. Ass't Surg. G. F. Huntington, U. S. A	200	27	173
6	Washington	Do.	Act. Ass't Surg. E. C. Strode, U. S. A	400	161	239
7	Webster	Do.	Surgeon J. L. Teed, U. S. V	500	54	446
8	Pest	Near Vicksburg, Miss	Act. Ass't Surg. E. H. Buck, U. S. A	80	35	45
9	U. S. General, No. 2	Do.	Surgeon R. F. Stratton, 11th Ill. Cav	175	78	97
10	U. S. General, No. 3	Do.	Surgeon B. S. Chase, 53d Colored Troops	250	82	168
				3,055	1,263	1,792

DEPARTMENT OF KANSAS.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	U. S. General	Leavenworth, Kans	Surgeon G. W. Hogeboom, U. S. V	300	160	140
2	U. S. General	Fort Scott, Kans	Surgeon A. C. Van Duyn, U. S. V	200	140	60
				500	300	200

DEPARTMENT OF THE CUMBERLAND.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	U. S. General, No. 1	Nashville, Tenn	Surgeon B. B. Breed, U. S. V	936	724	212
2	U. S. General, No. 2	Do.	Surgeon J. E. Herbst, U. S. V	886	717	169
3	U. S. General, No. 3	Do.	Surgeon J. R. Ludlow, U. S. V	660	590	70
4	U. S. General, No. 8	Do.	Ass't Surg. C. C. Byrne, U. S. A	540	451	89
5	U. S. General, No. 11	Do.	Act. Ass't Surg. G. W. Frances, U. S. A	720	95	625
6	U. S. General, No. 14	Do.	Surgeon S. E. Fuller, U. S. V	775	583	192
7	U. S. General, No. 15	Do.	Act. Ass't Surg. J. J. O'Reilly, U. S. A	400	319	81
8	U. S. General, No. 16	Do.	Act. Ass't Surg. J. S. Gilliam, U. S. A	289	289	
9	U. S. General, No. 17	Do.	Surgeon J. E. Herbst, U. S. V	120	117	3
10	U. S. General, No. 19	Do.	Surgeon W. H. Thorne, U. S. V	629	611	18
11	Cumberland	Do.	Surgeon B. Cloak, U. S. V	930	550	380
12	U. S. General, No. 1	Chattanooga, Tenn	Surgeon J. H. Phillips, U. S. V	761	761	
13	U. S. General, No. 2	Do.	Ass't Surg. R. McGowan, U. S. V	1,100	944	156
14	U. S. General, No. 4	Do.	Act. Ass't Surg. L. S. Tesson, U. S. A	160	135	25
15	Employés'	Do.	Surgeon C. H. Morton, 8th Ky. Vols	69	62	7
16	U. S. General	Gallatin, Tenn	Surgeon J. W. Beaty, 8th Tenn. Cav	108	104	4
17	U. S. General	Lookout Mountain, Tenn	Surgeon R. M. S. Jackson, U. S. V	800	326	474
18	Officers'	Do. do.	Surgeon L. D. Harlow, U. S. V	200	85	115
19	U. S. General	Murfreesboro', Tenn	Surgeon S. D. Turner, U. S. V	458	392	66
20	U. S. General	Tullahoma, Tenn	Surgeon S. Hay, U. S. V	100	91	9
21	Field	Bridgeport, Ala	Ass't Surg. H. T. Legler, U. S. V	200	83	117
				10,751	7,939	2,812

DEPARTMENT OF THE MISSOURI.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	Marine	St. Louis, Mo	Surgeon J. K. Rogers, U. S. V	300	272	28
2	Small-pox	Do	Act. Ass't Surg. S. W. Adreon, U. S. A	235	56	179
3	U. S. General	Benton Barracks, Mo	Surgeon Ira Russell, U. S. V	575	181	394
4	U. S. General	Jefferson Barracks, Mo	Surgeon John F. Randolph, U. S. A	1,700	1,605	95
5	U. S. General	Jefferson City, Mo	Surgeon J. H. Ledlie, U. S. V	230	189	41
6	U. S. General	Kansas City, Mo	Act. Ass't Surg. G. H. Hood, U. S. A	102	102	
7	U. S. General	Rolla, Mo	Act. Ass't Surg. B. Crowell, U. S. A	120	105	15
8	U. S. General	Springfield, Mo	Act. Ass't Surg. F. A. Bushey, U. S. A	200	128	72
				3,462	2,638	824

DEPARTMENT OF VIRGINIA AND NORTH CAROLINA.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	U. S. General	Near Fort Monroe, Va	Ass't Surg. E. M. Clellan, U. S. A	3,497	3,063	434
2	Portsmouth	Portsmouth, Va	Surgeon J. H. Frantz, U. S. A	850	660	190
3	Beaufort	Beaufort, N. C	Surgeon N. P. Rice, U. S. V	222	87	135
4	Foster	New Berne, N. C	Surgeon N. Mayer, 16th Conn. Vols	475	336	139
7	Mansfield	Morehead City, N. C	Ass't Surg. J. C. Palmer, 85th N. Y. Vols	300	137	163
				5,344	4,283	1,061

DEPARTMENT OF THE GULF.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	St. James	New Orleans, La	Ass't Surg. S. M. Horton, U. S. A	300	9	291
2	University	Do	Surgeon S. Kneeland, U. S. V	600	218	382
3	Marine	Do	Surgeon J. Baxter, U. S. V	800	255	545
4	U. S. Barracks	Do	Surgeon J. P. G. Baxter, U. S. V	928	133	795
5	St. Louis	Do	Surgeon A. McMahon, U. S. V	550	187	363
6	Charity	Do	Dr. A. W. Smith	650	10	640
7	Camp Parapet	Do	Surgeon F. E. Piquette, 86th U. S. C. T	1,500	835	665
8	U. S. General	Baton Rouge, La	Surgeon C. Winne, 77th Ill. Vols	480	344	136
				5,808	1,991	3,817

DEPARTMENT OF THE SOUTH.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	U. S. General	Beaufort, S. C	Surgeon John Treanor, jr., U. S. V	320	262	58
2	Officers'	Do	Surgeon A. P. Dalrymple, U. S. V	20	2	18
3	U. S. General	Hilton Head, S. C	Ass't Surg. John F. Huber, U. S. V	426	268	158
4	U. S. General	St. Augustine, Fla	Ass't Surg. James F. Weeds, U. S. A	175	73	102
				941	605	336

DEPARTMENT OF ARKANSAS.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	U. S. General	Little Rock, Ark		580	550	30
2	General	Do	Surgeon E. A. Clark, U. S. V	129	72	57
3	Officers'	Do		49	10	39
4	U. S. General	Fort Smith, Ark	Surgeon C. E. Swasey, U. S. V	325	292	33
5	U. S. General	Helena, Ark	Ass't Surg. W. M. Dennis, U. S. V	200	62	138
6	U. S. General	Duvall's Bluff, Ark	Surgeon E. A. Lee, 54th U. S. C. T	187	115	72
				1,517	1,101	416

DEPARTMENT OF WESTERN VIRGINIA.

No.	Name.	Locality.	Medical Officer in charge.	Beds.	Occupied.	Vacant.
1	Cumberland	Cumberland, Md	Surgeon J. B. Lewis, U. S. V	1,000	707	293
2	Frederick	Frederick, Md	Ass't Surg. R. F. Weir, U. S. A	1,114	757	357
3	Grafton	Grafton, W. Va	Surgeon S. N. Sherman, U. S. V	302	173	129
4	Parkersburg	Parkersburg, W. Va	Ass't Surg. W. A. Hamlin, U. S. V	382	197	185
5	U. S. General	Wheeling, W. Va	Act. Ass't Surg. John Barnes, U. S. A	200	144	56
				3,498	1,978	1,020

RECAPITULATION.

DEPARTMENTS.	CAPACITY.	OCCUPIED.	VACANT.
Washington	21,426	13,865	7,561
Pennsylvania	18,709	13,412	5,297
Ohio	8,535	6,970	1,565
East	14,829	9,302	5,527
Northern	11,421	10,735	686
Middle	6,189	4,993	1,196
Northwest	2,532	2,034	498
Tennessee	3,055	1,263	1,792
Kansas	500	300	200
Cumberland	10,751	7,939	2,812
Missouri	3,462	2,638	824
Virginia and North Carolina	5,344	4,283	1,061
Gulf	5,808	1,991	3,817
South	941	605	336
Arkansas	1,517	1,101	416
West Virginia	3,038	1,978	1,060
Total	118,057	83,409	34,648

The following report by Surgeon W. C. SPENCER, U. S. Army, describes the operations of the Medical Purveying Bureau, on which the various hospitals, field and general, depended for their supplies of medicines, hospital stores, instruments, dressings, books and stationery, bedding, etc.

The medical supplies of the Army were derived for many years prior to 1861 almost entirely from the Purveying Depot at New York City. All the military posts in the East and many of those in the South and on the Western frontier were supplied directly from that depot; but, for the purpose of securing the prompt distribution of stores to other points more difficult of access, several subdepots had been established in the South and West. Four of these were in existence in the year 1860, located respectively at New Orleans, La., San Antonio, Tex., Camp Floyd, Utah, and Albuquerque, N. M.

By the commencement of hostilities in the spring of 1861 great responsibility was suddenly thrown upon the Medical Bureau. The rapid organization of a large volunteer force taxed to the utmost the resources of a department compelled to act under circumstances of excessive embarrassment. The quantity of supplies at the principal depot was extremely small; the manufacture of articles peculiar to the military service involved unavoidable delay, while the funds at the command of the bureau were entirely inadequate to the emergency. Still, the urgent requirements of the troops were met with vigor and promptitude. The principal purveyor was directed to forward immediately to Washington large quantities of medicines, dressings, instruments and bedding; to cause necessary supplies to be prepared with all possible haste and to hold them in constant readiness. Subdepots were also at once established at Washington, D. C., St. Louis, Mo., and Cairo, Ill., in charge of experienced and efficient officers.

The regiments recently formed were with few exceptions well equipped. Many procured their medical outfit from the authorities of their respective states, many were supplied by the purveyors from the points already mentioned, while others proceeded to their destination with very imperfect provision for the sick and wounded, the result almost invariably either of the inexperience of their commanding and medical officers or of the urgency of the orders of the military authorities.

Additional purveying depots, as they became necessary, were established and liberally outfitted. Their location was determined by proximity to the main bodies of troops, facility of railroad and water transportation and the advantages of the market. As many as thirty of these were in active operation during the greater part of the war period.

In addition to the stores accumulated at the depots, supplies, especially adapted to meet the emergencies occasioned by severe engagements, were placed in charge of a medical officer detailed as a field purveyor. It was the duty of this officer to accompany the army upon its marches, to remain with it while in camp, to issue the reserve supply whenever it was needed, and to replenish it by timely requisitions upon the nearest depot.

By far the greater part of the purchases was made by the purveyors at New York and Philadelphia, and from them the supplies of the purveyors at the remaining points were derived either by means of requisitions approved by the Surgeon General, or through orders emanating directly from him. Purchases less in amount were made, however, at Washington, St. Louis, Cincinnati, Chicago, Louisville and other places, when suitable articles could be procured upon favorable terms. By means of duplicates of the bills of purchase forwarded at the date of each transaction the bureau was constantly informed of the state of the markets and enabled to regulate its purchases with advantage.

During the summer of 1861 a revised edition of the Regulations for the Army was prepared. This was promulgated August 10, 1861, and by it the Medical Supply Table was materially enlarged and improved. By Act of Congress, approved April 16, 1862, still greater latitude was given in the purchase and issue of medical stores. Section 5 of this act provided:

"That medical purveyors shall be charged, under the direction of the Surgeon General, with the selection and purchase of all medical supplies, including new standard preparations, and of all books, instruments, hospital stores, furniture and other articles required for the sick and wounded of the army. In all cases of emergency they may

provide such additional accommodations for the sick and wounded of the army, and may transport such medical supplies as circumstances may render necessary, under such regulations as may hereafter be established, and shall make prompt and immediate issues upon all special requisitions made upon them under such circumstances by medical officers; and the special requisitions shall consist simply of a list of the articles required, the quantity required, dated and signed by the medical officer requiring them."

The bureau promptly availed itself of the authority thus conveyed. On June 17, 1862, a board composed of Surgeon R. S. SATTERLEE, U. S. Army, Medical Purveyor at New York, Surgeon R. O. ABBOTT, U. S. Army, and E. R. SQUIBB, M. D., was convened at the city of New York for the purpose of incorporating in the existing Supply Table such improvements as were dictated by the experience of the war.

The report of the board was made on July 15, 1862. On the 20th of the succeeding October a circular to medical officers was issued by the Surgeon General containing the Revised Standard Supply Table and "Directions concerning the manner of obtaining and accounting for Medical and Hospital Supplies for the Army." The following extracts from these Directions are submitted:

"The standard of medical and hospital supplies for the Army is the following supply table. It is not the design of the Department to confine medical officers absolutely to that table, either in variety or quantity, but only to establish a standard for their guidance in making requisitions for supplies, leaving individual preferences to be indulged at the discretion of the Medical Director or the Surgeon General. Neither is it supposed that the quantities of the table will always meet the necessities of unusual emergencies, as during epidemics or in unhealthy seasons and localities; and medical officers who allow their supplies to be exhausted through any such contingencies, without timely notice of their approaching necessities, will be held to a strict accountability." * * * "Those articles of the standard supply table which are printed in italics will be furnished only on special requisitions approved by the Surgeon General." * * * "Articles of furniture and appliances in Class No. 2 will be issued on 'requisitions for outfits,' but not on 'requisitions to replenish supplies,' unless the medical officer certifies that they cannot be purchased with the hospital fund." * * * "Carbolic acid (Bower's), sulphate of iron, nitrate of lead, chlorinated lime or charcoal will be furnished as antiseptics or disinfectants, when required." * * * "Applications for microscopes by medical officers in charge of general hospitals will be favorably considered, provided the evidence be satisfactory that the officer will use the instrument for the benefit of science and will report the results of his observations to the Surgeon General."

This circular was reissued in substantially the same form on May 7, 1863. The only alterations of importance that were made in the table consisted in the omission of calomel and tartar emetic, the readjustment of the contents of the medical pannier and the substitution of medicine cases for the hospital knapsack.

The quantity and cost of the medicines, hospital stores, dressings, bedding and clothing required for the use of the troops had at this time become so great that the advisability of their preparation and manufacture by the department itself came under consideration. The advantages anticipated from the measure were:—the ability to ascertain in every instance the comparative purity of the wines, liquors, hospital stores and crude drugs offered to the department; the attainment of perfect purity and reliability in the medicines prepared; the securing of uniformity in the mode of putting up the supplies for issue and the saving to the Government of a great part of the profit made by the ordinary dealers.

Having determined upon the adoption of the proposed measure the department energetically proceeded to carry it into effect. Early in the spring of 1863 a laboratory was organized at Astoria, Long Island, in connection with the purveying depot at New York City; another was established at Philadelphia, Pa., to co-operate with the depot at that place. They were liberally furnished with suitable apparatus; well qualified medical officers were assigned to their supervision, and the preparation of supplies was at once commenced. A small laboratory was instituted at the same time at the purveying depot at St. Louis, Mo.; but its operations were confined principally to the putting up in packages adapted to reissue of medicines purchased in bulk and the manufacture of bedding and hospital clothing.

The results attained by these laboratories completely substantiated the correctness of the views which led to their establishment. An elaborate "Statement of the cost-price and market value of preparations manufactured and put up at the Army Laboratory at Philadelphia, Pa., since its commencement in March, 1863, to September 30, 1865," proved that the net financial gain to the Government during that period was $766,019.32. A similar exhibit presented by the Superintendent of the Laboratory at Astoria indicated, as a consequence of its transactions for the six months ending November 30, 1864, savings which amounted to $279,972.04. The savings at the laboratory at St. Louis from March 1, 1863, to July 31, 1863, were $5,451.96.

During the progress of the war arrangements were made by the Medical Bureau with various contractors by which the delivery of ice to hospitals situated in the South and Southwest was secured. These hospitals were unable to procure the requisite supply from local dealers. The number of southern localities embraced in the contracts was materially increased in the years 1864 and 1865, and it was found advantageous to include many Northern and Western points. Large quantities of ice were also forwarded for the use of armies engaged in active hostilities. Instructions were issued by the Surgeon General by which its expenditure was regulated. The per diem allowance for each patient in hospital south of the latitude of Washington, D. C., was fixed at one pound; north of that latitude at half a pound. The ice procured in this manner during the years 1862, 1863, 1864 and 1865 amounted in the aggregate to 48,661 tons. The vast quantities purchased from the hospital funds by the general, post and regimental hospitals throughout the country are not included in this statement.

By an Act of Congress, approved July 16, 1862, an appropriation of $15,000 was made for providing mutilated soldiers and seamen with artificial limbs. Subsequent expenses for the same object were included in the annual estimates for the Medical Department of the Army. On August 12, 1862, a Board convened in New York City, in com-

pliance with the instructions of the Surgeon General, to examine models of artificial limbs and to select the best for adoption. Similar boards were convoked afterwards for the purpose of enabling the Department to avail itself of the improvements made in apparatus of this character and to designate the prices that should be paid. Every soldier entitled to an artificial limb was permitted to choose from the specimens of approved models deposited in the office of the Medical Director at Department Headquarters the one with which he desired to be supplied. Upon examination of the records it is found that there were furnished to soldiers, at the expense of the United States during the period intervening between July 16, 1862, and May 4, 1867, 49 artificial eyes, 61 hands, 2,391 arms, 4,095 legs, 14 feet and 144 apparatus for resection.

The tabular statement which concludes this article is an exhibit of the quantity of certain of the supplies purchased and manufactured during the war by the Medical Department of the Army. It is presented not only on account of its intrinsic interest and value, but also as an evidence of the faithfulness, liberality and efficiency with which the Government provided, through its own agencies, for the welfare of the sick and wounded.

ARTICLES.	QUANTITY.
Acaciæ pulvis, in ½-lb. bottles—oz.	869,070
Acidum aceticum, in ½-lb. g. s. bottles—oz.	353,477
Acidum sulphuricum aromaticum—oz.	395,708
Acidum tannicum, in 1-oz. bottles—oz.	83,550
Acidum tartaricum, in 8-oz. bottles—oz.	399,977
Æther fortior, in ½-lb. g. s. bottles and ¼-lb. tins—oz.	1,002,045
Ætheris spiritus compositus, in ½-lb. g. s. bottles—oz.	357,372
Ætheris spiritus nitrici, in ½-lb. g. s. bottles—oz.	1,610,361
Alcohol fortius, in 32-oz. bottles—bottles	483,930
Ammoniæ, liquor, in ½-lb. g. s. bottles—oz.	1,237,627
Argenti nitras, in 1-oz. g. s. bottles—oz.	42,185
Argenti nitras fusus, in 1-oz. bottles—oz.	35,818
Camphora, in 8-oz. bottles—oz.	924,184
Ceratum adipis (simple cerate), in 1-lb. pots—lbs.	210,880
Ceratum resinæ, in 1-lb. pots—lbs.	51,049
Chloroform—oz.	1,146,982
Creta preparata, in ½-lb. bottles—oz.	243,048
Extractum aconiti radicis fluidum, in ½-lb. bottles—oz.	218,326
Extractum belladonnæ, in 1-oz. pots—oz.	28,243
Extractum buchu fluidum, in ½-lb. bottles—oz.	309,896
Extractum cinchonæ fluidum (with aromatics)—oz.	518,957
Extractum colocynthidis compositum, in 8-oz. pots—oz.	188,030
Extractum conii, in 1-oz. pots—oz.	13,524
Extractum gentianæ fluidum, in ½-lb. bottles—oz.	347,173
Extractum hyoscyami, in 1-oz. pots—oz.	20,534
Extractum ipecacuanhæ fluidum, in ½-lb. bottles—oz.	313,739
Extractum nucis vomicæ, in 1-oz. pots—oz.	11,989
Extractum pruni virginianæ fluidum, in ½-lb. bottles—oz.	307,323
Extractum rhei fluidum, in ½-lb. bottles—oz.	258,009
Extractum senegæ fluidum, in ½-lb. bottles—oz.	315,633
Extractum valerianæ fluidum, in ½-lb. bottles—oz.	170,525
Extractum zingiberis fluidum, in ½-lb. bottles—oz.	506,380
Ferri chloridi tinctura, in ½-lb. g. s. bottles—oz.	616,474
Ferri iodidi syrupus, in ½-lb. g. s. bottles—oz.	162,614
Ferri et quiniæ citras, in 1-oz. bottles—oz.	50,772
Ferri persulphatis liquor, in 4-oz. g. s. bottles—oz.	130,997
Ferri persulphatis pulvis, in 1-oz. g. s. bottles—oz.	153,741
Ferri sulphas, in 4-oz. bottles—oz.	544,045
Ferri pilulæ, in 8-oz. pots—oz.	277,808
Hydrargyrum cum creta, in ½-lb. bottles—oz.	69,278
Ipecacuanhæ pulvis, in ½-lb. bottles—oz.	328,029
Ipecacuanhæ et opii pulvis, in ½-lb. bottles—oz.	447,151
Lini pulvis, in tins—lbs.	415,996
Magnesiæ sulphas—lbs.	515,828
Morphiæ sulphas, in 4-oz. bottles—oz.	27,200
Oleum ricini, in 32-oz. bottles—oz.	220,334
Opii pulvis, in ½-lb. bottles—oz.	552,196
Opii tinctura, in ½-lb. bottles—oz.	828,258
Opii tinctura camphorata, in ½-lb. bottles—oz.	993,311
Pilulæ opii, in g. s. bottles—doz.	813,156
Potassæ bitartras, in ½-lb. bottles—oz.	556,488
Potassæ chloras, in ½-lb. bottles—oz.	568,923
Potassii iodidum, in ½-lb. bottles—oz.	531,744
Quiniæ sulphas, compressed in 5-oz. tins—oz.	595,544
Rhei pulvis, in 4-oz. bottles—oz.	132,552
Scillæ syrupus, in 1-lb. bottles—lbs.	183,582
Sodæ chlorinatæ liquor, in 1-lb. g. s. bottles—lbs.	167,459
Sodæ bicarbonas, in ½-lb. bottles—oz.	652,913
Sodæ et potassæ tartras, in ½-lb. bottles—oz.	798,553
Spiritus lavandulæ compositus, in ½-lb. bottles—oz.	404,117
Spiritus frumenti (whiskey), in 32-oz. bottles—bottles	1,907,145
Spiritus vini gallici, in 32-oz. bottles—bottles	582,187
Vinum album (sherry), in 32-oz. bottles—bottles	736,459
Zinci chloridi liquor, in 1-lb. g. s. bottles—oz.	486,966
Zinci sulphas, in 1-oz. bottles—oz.	92,805
HOSPITAL STORES.	
Arrow-root—lbs.	62,226
Beef, extract of, in 2-lb. tins—lbs.	570,980
Cocoa, or chocolate, in tins or cakes—lbs.	129,596
Coffee, extract of, in [illegible] tins—galls.	25,317
Corn-starch, in 1-lb. papers—lbs.	218,708
Farina, in 1-lb. papers—lbs.	251,837
Gelatine, shred, in ¼-lb. packages—lbs.	13,067
Milk, concentrated, in 1-lb. tins—lbs.	479,014
Porter, in pint bottles—bottles	1,833,948
Tea, black, in tins or original chests—lbs.	429,695
Tapioca, in tins—lbs.	85,226
INSTRUMENTS.	
Amputating cases—no.	360
Amputating and trephining cases—no.	235
Compact field cases—no.	3,955
Electro-magnetic machines—no.	20
Exsecting cases—no.	150
General operating cases—no.	596
Minor operating cases—no.	77
Personal instruments—sets	273
Pocket cases—no.	12,656
Post-mortem cases—no.	303
Trephining cases—no.	213
Tourniquets, field—no.	50,214
Tourniquets, screw, with pad—no.	13,974
Trusses, inguinal, double—no.	6,350
Trusses, single—no.	43,529
DRESSINGS, ETC.	
Adhesive plaster, 5 yards in a can—yds.	327,943
Cotton bats—no.	66,727
Cotton wadding—sheets	73,225
Flannel, red, all wool—yds.	159,593
Gutta-percha cloth—yds.	106,011
Ichthyocolla plaster, 1 yd. in case—yds.	224,767
Lint, patent, linen or flax—lbs.	147,135
Lint, picked or scraped, linen—lbs.	82,754
Muslin, bleached, unsized, 1 yd. wide—yds.	3,512,442
Oiled muslin, in 4½-yd. pieces—yds.	72,219
Oiled silk, in 4½-yd. pieces—yds.	91,702
Roller bandages, assorted, in a pasteboard box—doz.	668,817
BEDDING.	
Bed-sacks—no.	522,246
Beds, water, of India rubber—no.	1,144
Blankets, white; gray for the field—no.	1,165,805
Counterpanes, according to pattern—no.	496,759
Cushions, rubber, with open centre—no.	6,486
Cushions, rubber, for air or water, small—no.	11,724
Gutta-percha bed-covers—no.	39,551
Mattresses, hair, in two equal parts, to pack folded—no.	75,920
Mattresses, of straw, moss or shucks—no.	169,080
Mosquito-bars, when specially required—no.	221,058
Pillows, hair—no.	367,513
Pillow-cases, cotton, colored—no.	631,801
Pillow-cases, linen, white—no.	418,365
Pillow-ticks—no.	318,815
Sheets, linen—no.	1,638,770
FURNITURE AND APPLIANCES.	
Basins, tin, wash-hand—no.	92,893
Bed-pans, delf, shovel-shape—no.	38,378
Bedsteads, iron—no.	274,704
Close-stools—no.	9,737
Lanterns, glass—no.	39,499
Medicine panniers, furnished by the list—no.	5,830
Medicine wagons—no.	251
Mess-chests, furnished by list—no.	3,954
Mugs, delf—no.	247,993
Pitchers, delf, half-gallon—no.	35,433
Plates, delf—no.	472,022
Ranges, size as required, with fixtures complete—no.	204
Spittoons—no.	89,169
Stoves, cooking, with fixtures complete—no.	1,821

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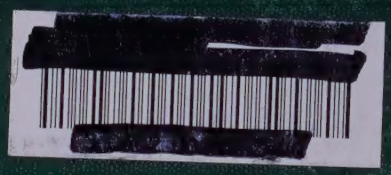
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